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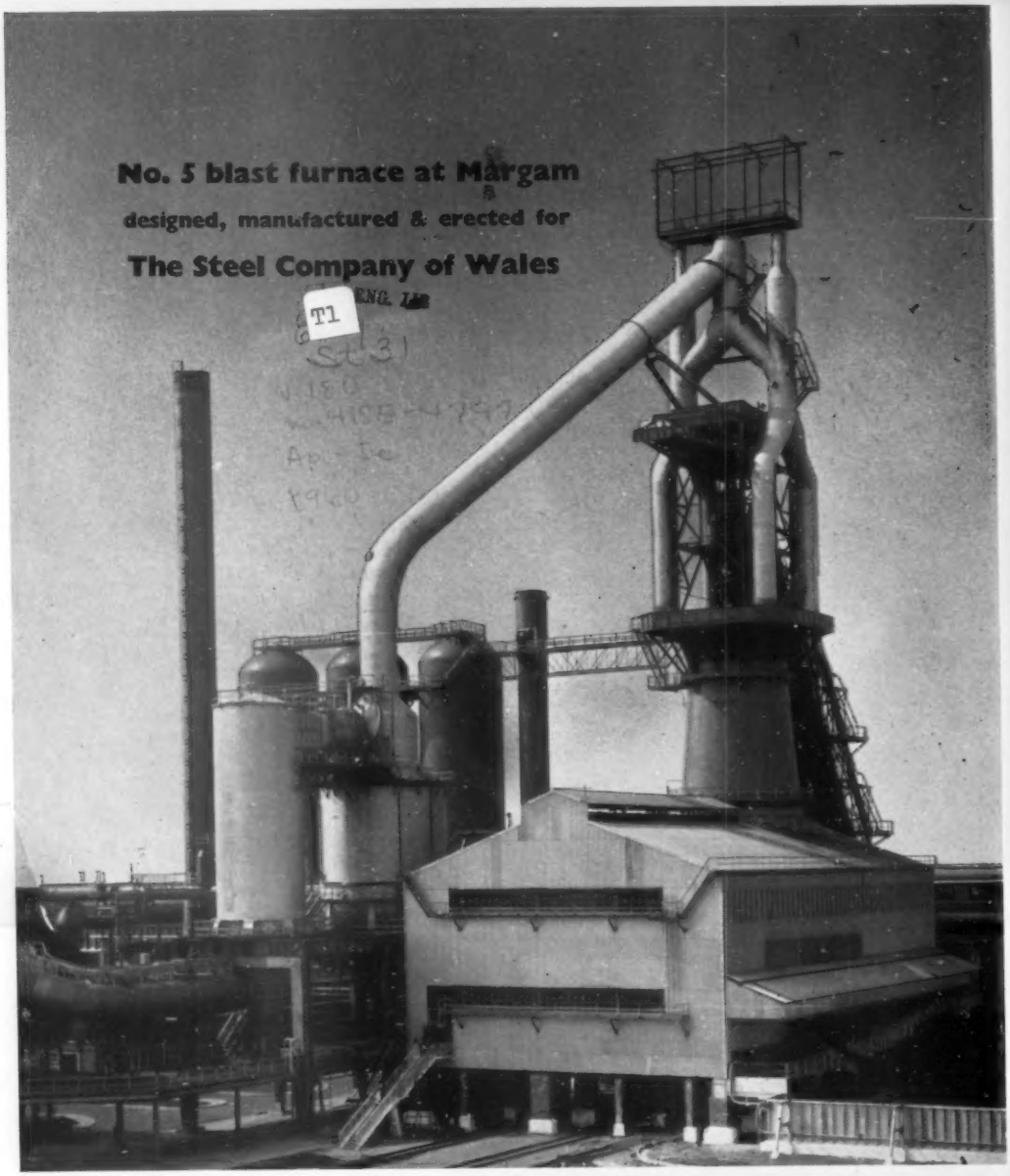

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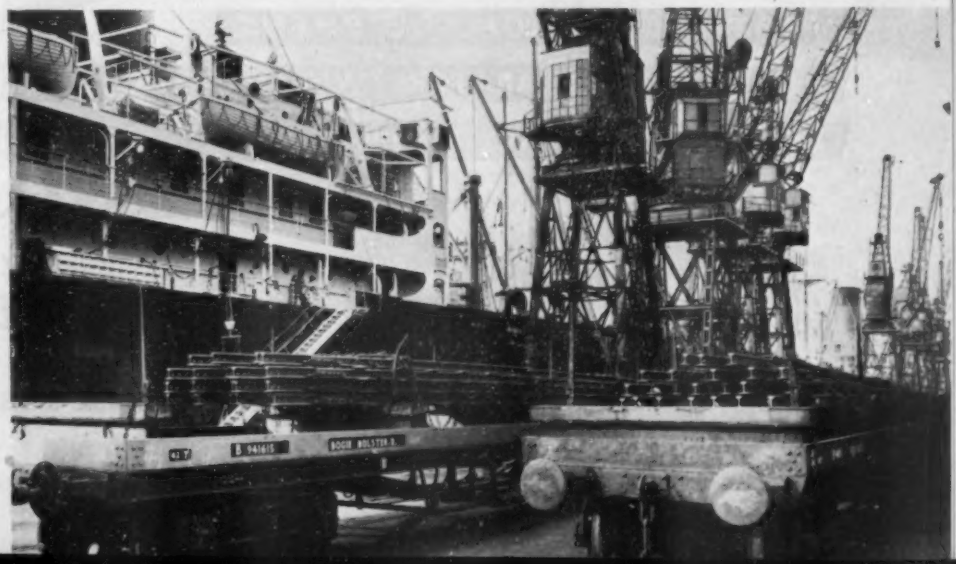

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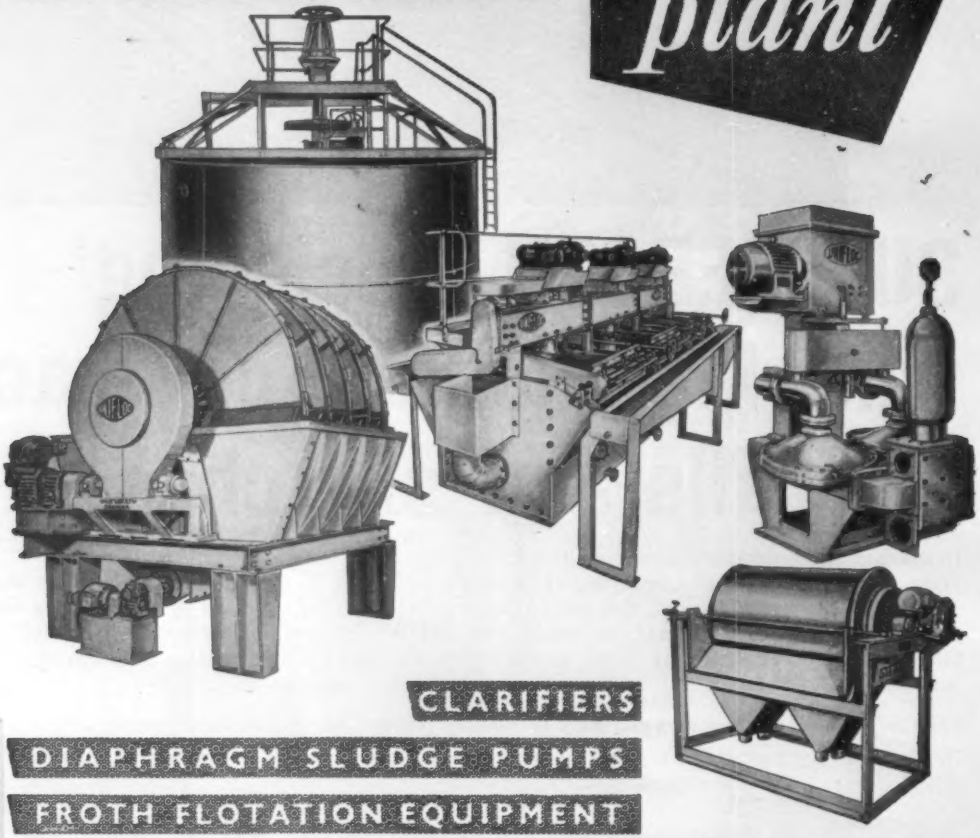

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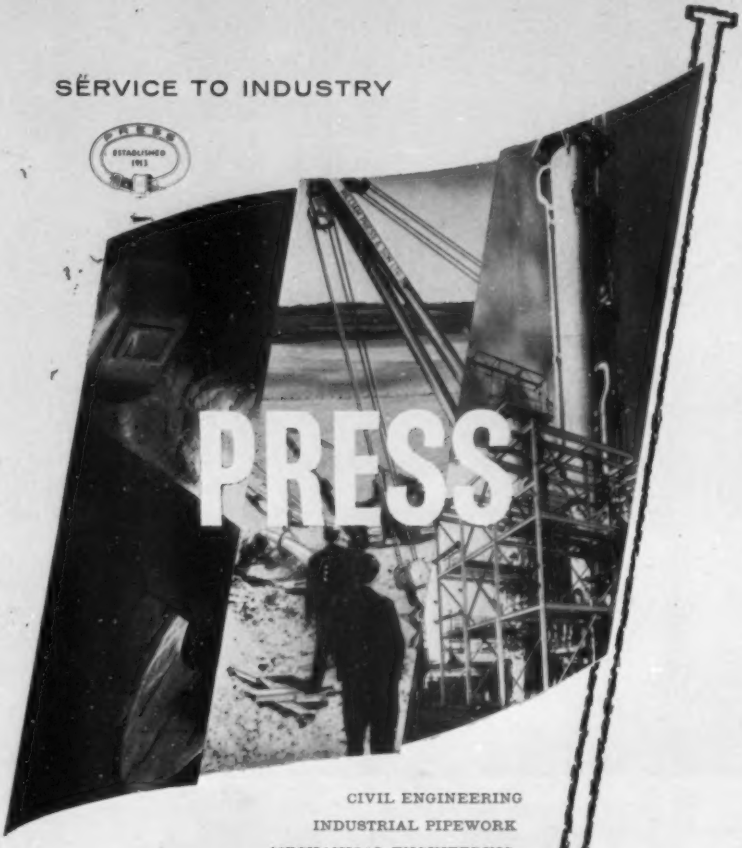

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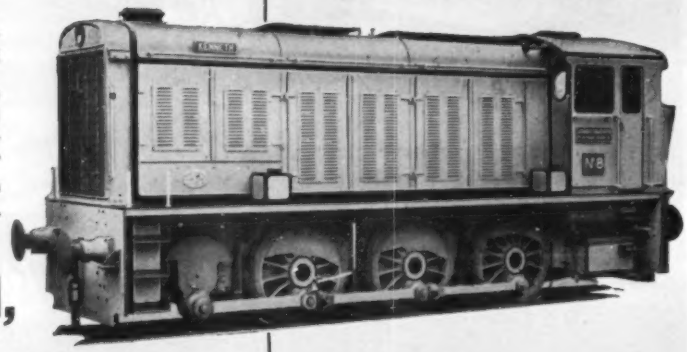

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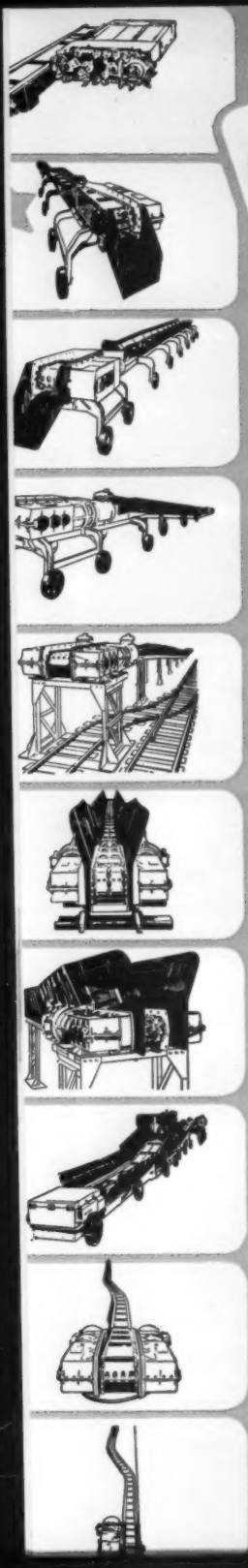

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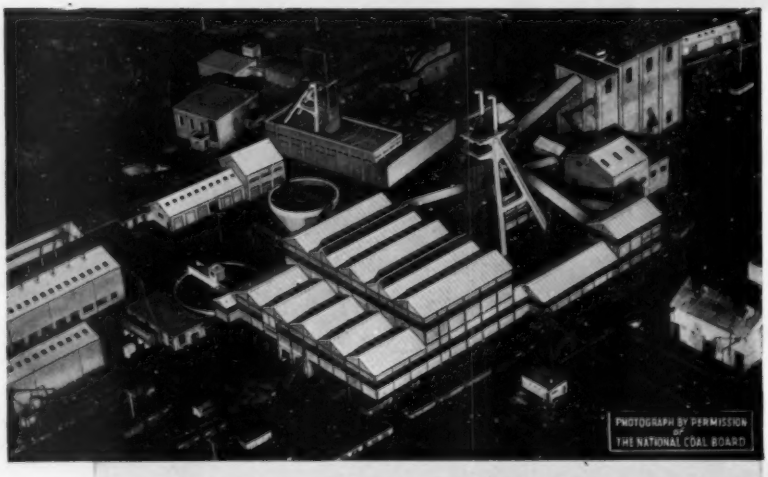

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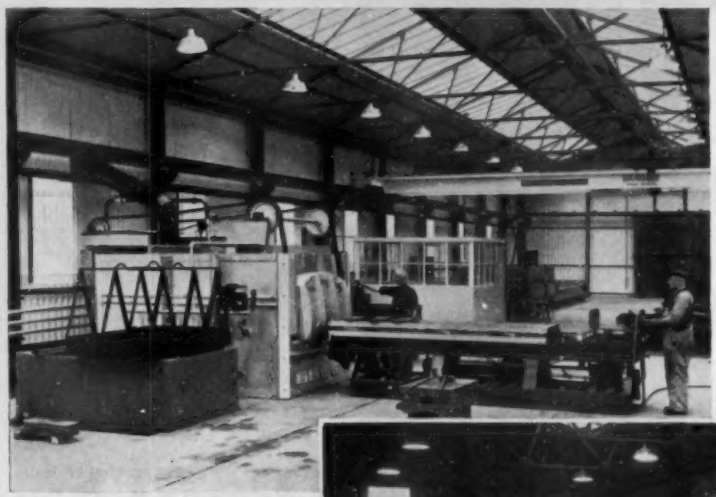

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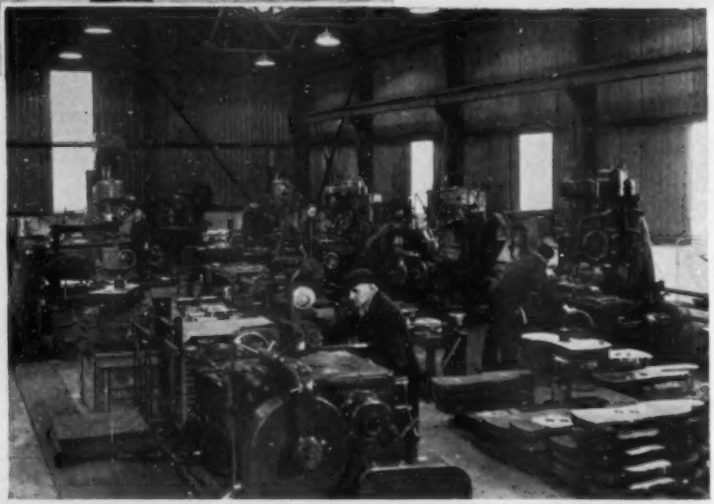
General View of Heat treatment and Testing shop—



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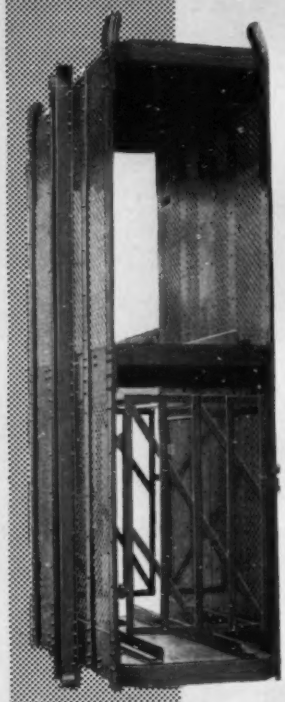

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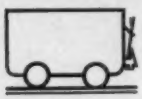

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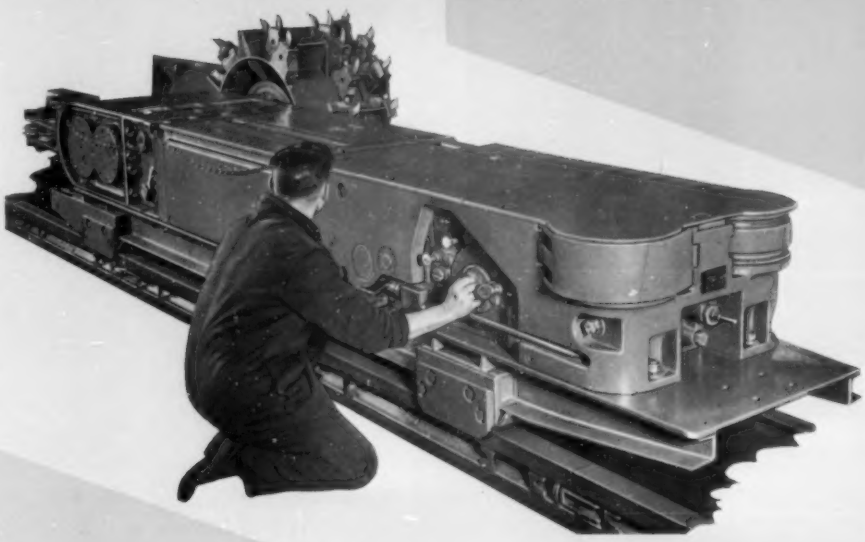

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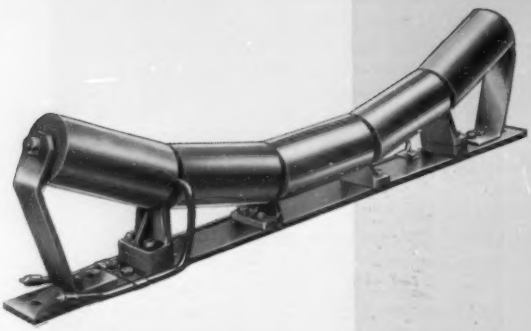

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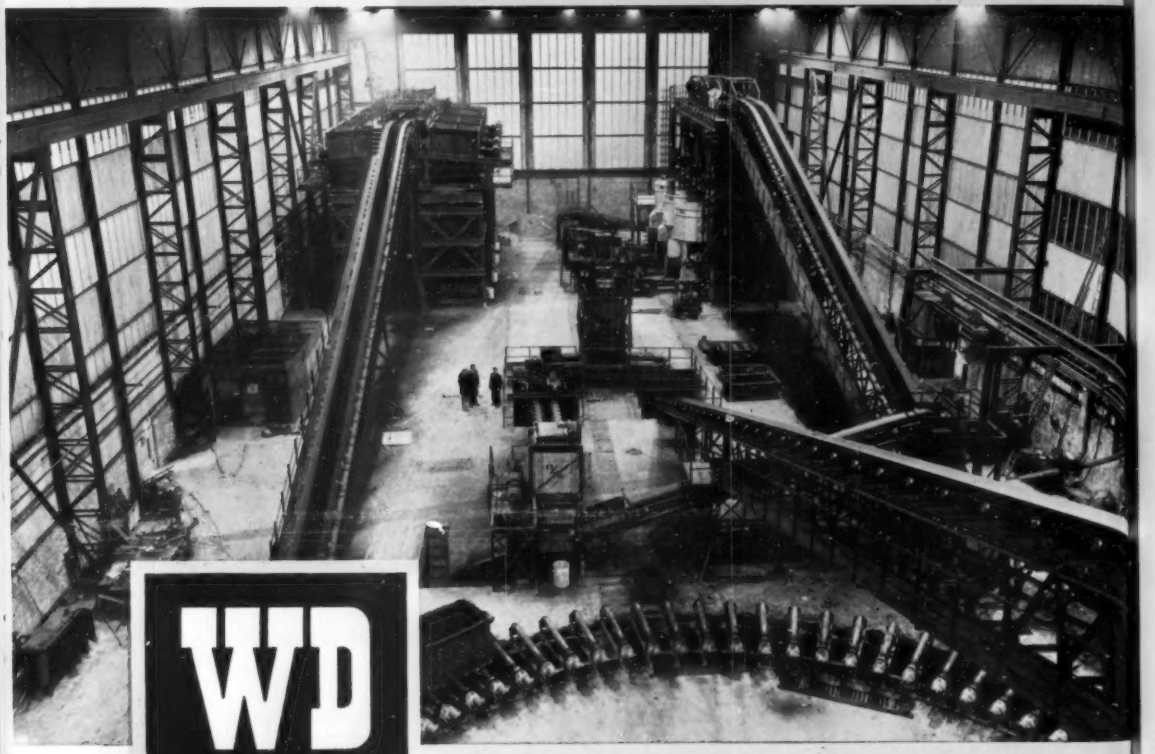

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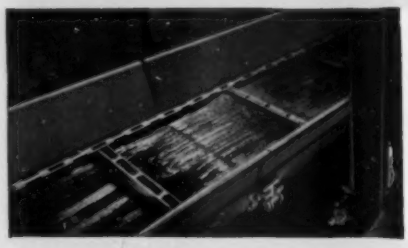

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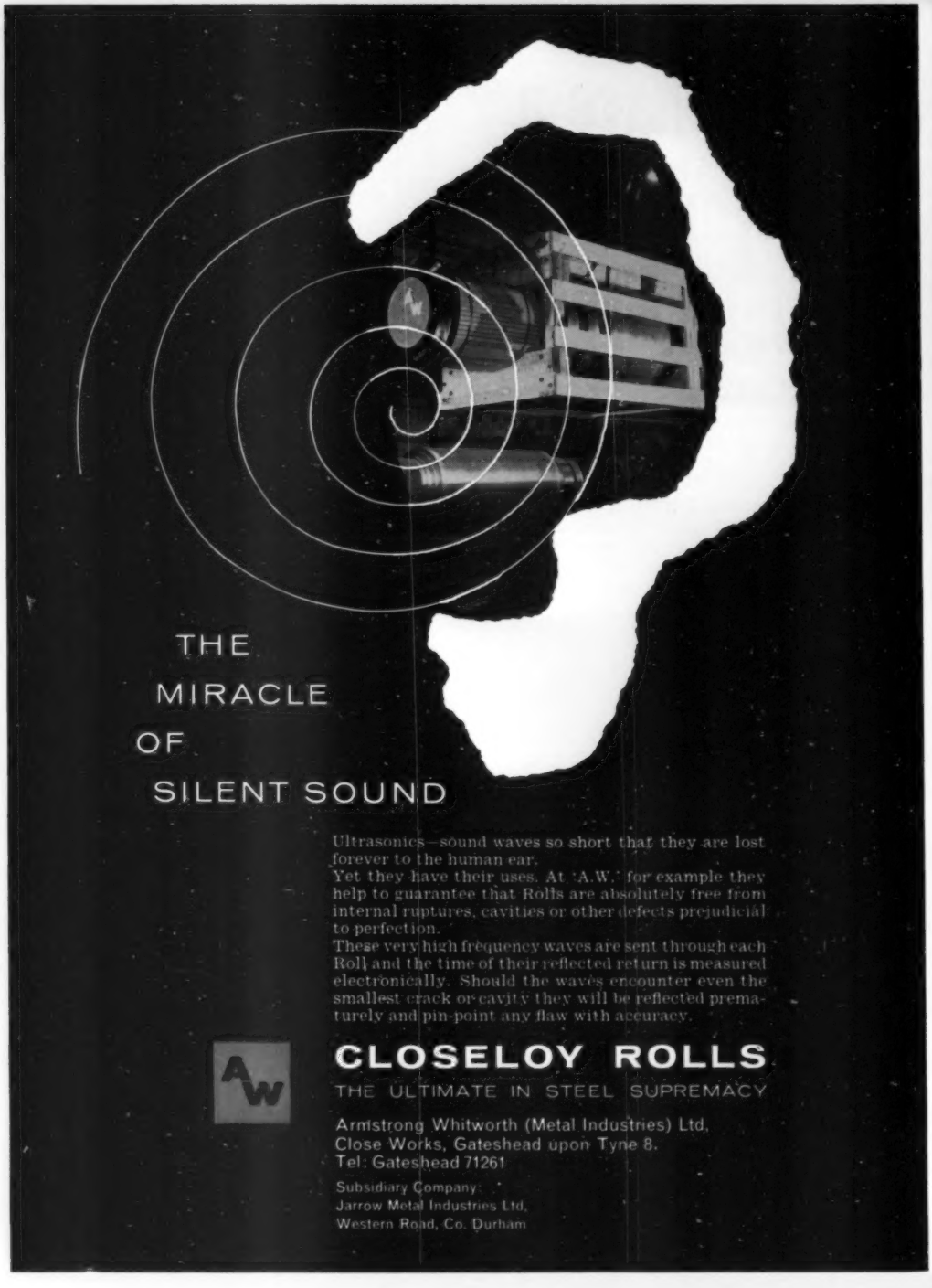
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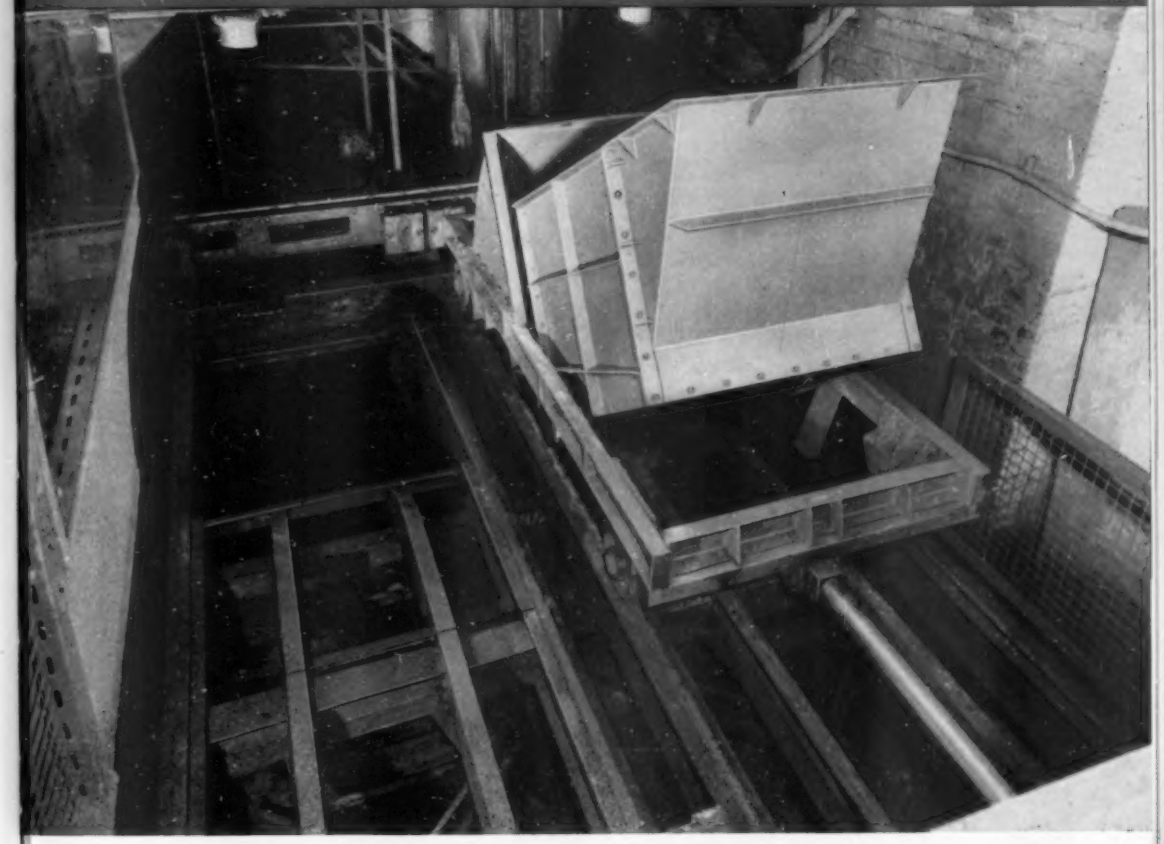

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- *Means less height for loading equipment*
- *Now designed with boom loaders to fill tipping cars, so cutting coal degradation still further*
- *Rapid Skip loading as the loading car tips*

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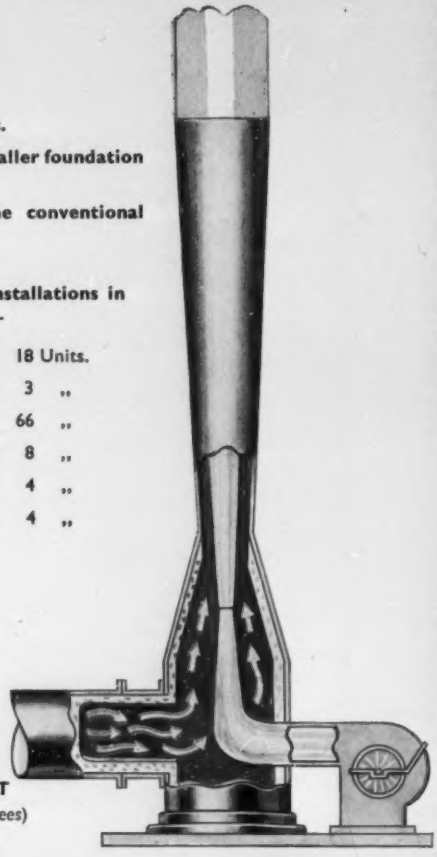
Handle Hot Gases—Maximum Temperatures up to 2,000° F.



No hot gases pass through fan.

Draught unaffected by weather conditions.

Require less steel, less refractories and smaller foundation than usual stack systems.

Suitable for any application where the conventional type of stack is used.

Recent MORGAN-ISLEY EJECTOR Installations in Great Britain comprise:—

Glass Tanks	18 Units.
Open Hearth	3 ,,
Soaking Pits	66 ,,
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Reheating Furnaces	4 ,,
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- **MORGAN GAS MACHINES**
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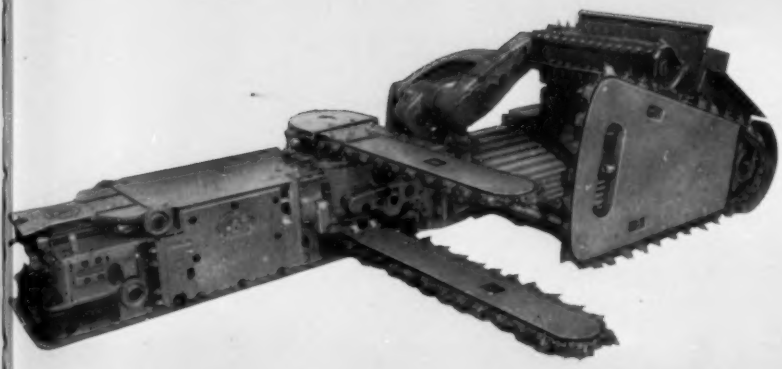
PER ANNUM WITH A HIGH PROPORTION OF LARGE COAL



Last year about 11,000,000 tons of coal were produced by A.B. Meco-Moore Cutter Loaders. These machines have proved their ability to produce large coal from a variety of seams and conditions during the last 20 years and our Underground Demonstrators, with their wide experience, are always available to advise and assist with installations. They are backed by a reliable and efficient spares and service organisation.

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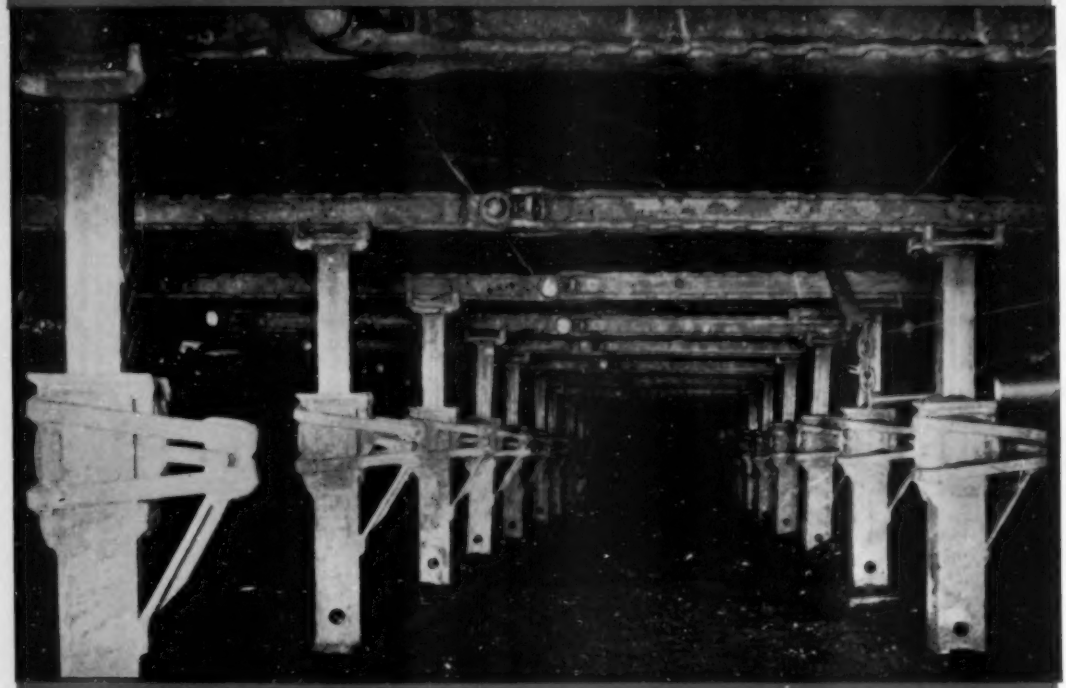
Long efficient life with low maintenance costs. Pre-loading and yielding with maximum safety. Made in Britain.

With acknowledgements to the National Coal Board.



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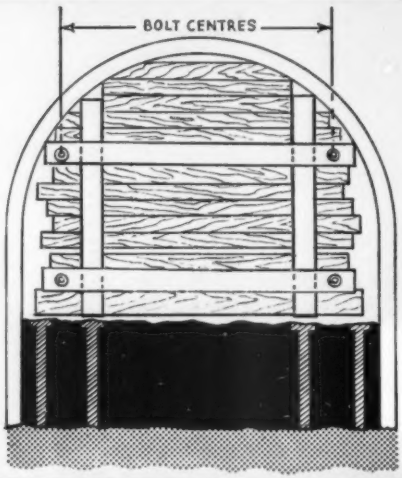
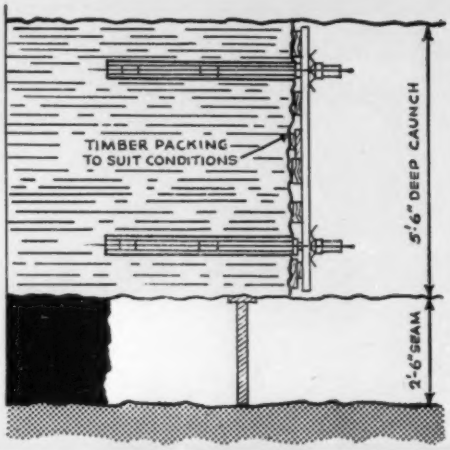
Siskol

Recoverable Support Bolt





The Siskol Support Bolt is a quality product. Its purpose is to anchor a shield across the exposed face of the ripping to prevent fragmentation.

It is recoverable, easy to fix, built to stand up to hard usage and is tested to withstand a pull of ten tons.

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Dependability in service comes from *quality* of engineering

It is processes like the one illustrated here that ensure the complete dependability of Ruston-Bucyrus machines. Surface hardening of swing-gear teeth, using oxy-gas flame techniques, also hardening of cone roller path by the progressive method under automatic control of optical pyrometer gives RB truck frames the resistance to withstand the most punishing operational conditions.

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DORMAN LONG (STEEL) LIMITED

This new volume worthily matches its now world-famous predecessors, of which the two most recent featured the COLVILLE Group of Companies and the VELINDRE works of the Steel Company of Wales Limited.

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Reduce your 'Cost to Produce' by specifying

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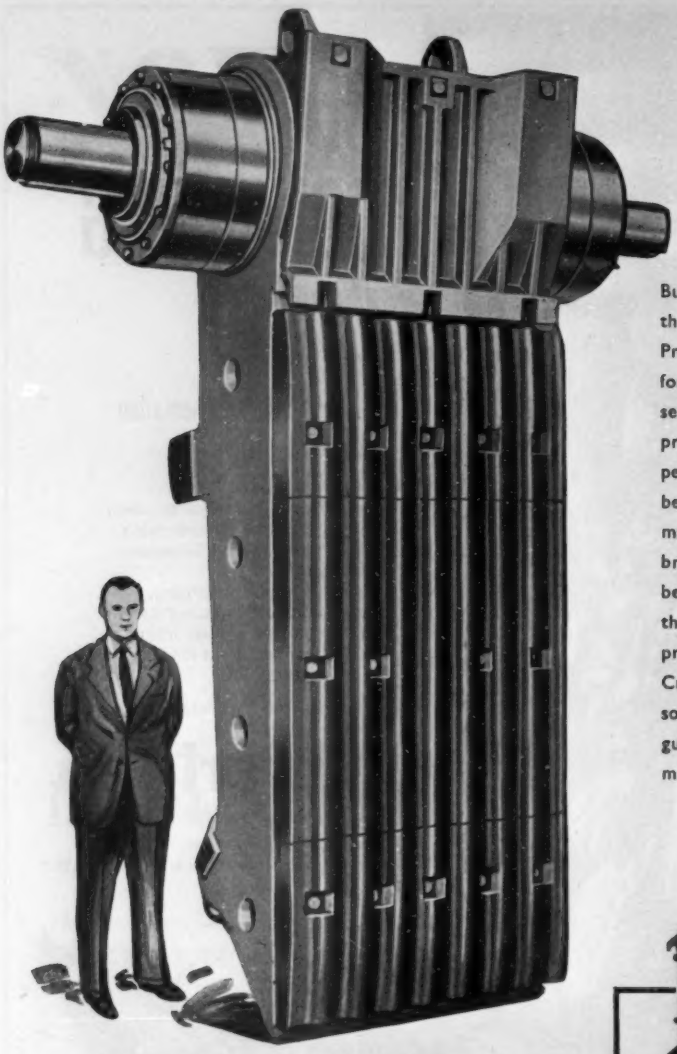
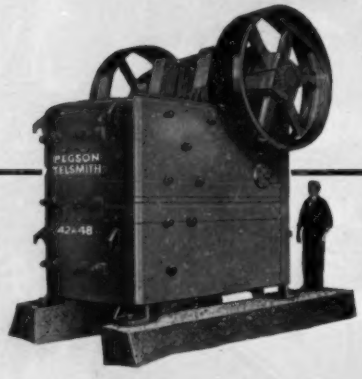


Built for performance and punishment—that's the Pegson Telsmith 42in. x 48in. Primary Jaw Crusher. Take the jawstock for example: an annealed, deep-box section, steel casting of massive proportions accurately machined for perfect register of the heavy roller bearings, toggle seat and 3-piece manganese jaws. Note also the special brackets on each side, which relieve the bearings of jawstock side thrust, and the huge manganese hub plate which protects the casting. Every Pegson Crusher component is built to the same solid and precise standards—to guarantee the best in performance no matter how arduous the conditions.



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single toggle roller bearing JAW CRUSHERS

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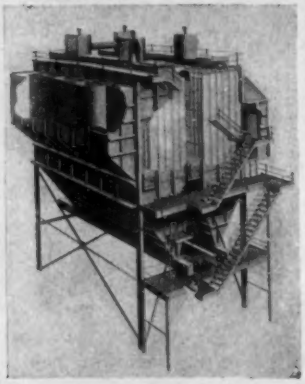
Is this your problem?

Nowadays the chimney-stack plume that used to be regarded as a sign of industrial prosperity merely indicates dirt, damage and defacement. If you are introducing the latest techniques in steel furnace and converter operation, or in sintering, waste of valuable material and severe atmospheric pollution are the prices to be paid unless first-class gas-cleaning and dust-collecting equipment is included in the project.

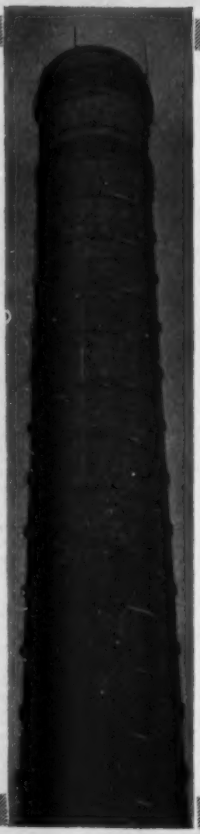
Here's your answer

In choice of equipment and in matters of detailed design alike, it's no use depending on confidence and inspiration. Confidence backed by solid achievement is what counts. If you believe in the old adage that nothing succeeds like success, you'll not overlook this record:—

- SIMON-CARVES built the first open-hearth furnace precipitator in this country, and are now dealing with a repeat order.
- SIMON-CARVES are installing precipitators on sinter plant in two continental steelworks.
- SIMON-CARVES have received the order for the first L.D. Converter precipitator in this country.
- SIMON-CARVES have been in the precipitator business for over thirty years.



This precipitator was specially designed to deal with very fine fume and dust from oxygen-process open-hearth furnaces. The large illustration is of the stack of a furnace with the precipitator switched off. Right—the same stack, minutes later, with the precipitator switched on. The stack illustrations are from unretouched photographs taken by Simon-Carves' clients. For further information, write to CPP Div. (I.C.T.) at the address below.



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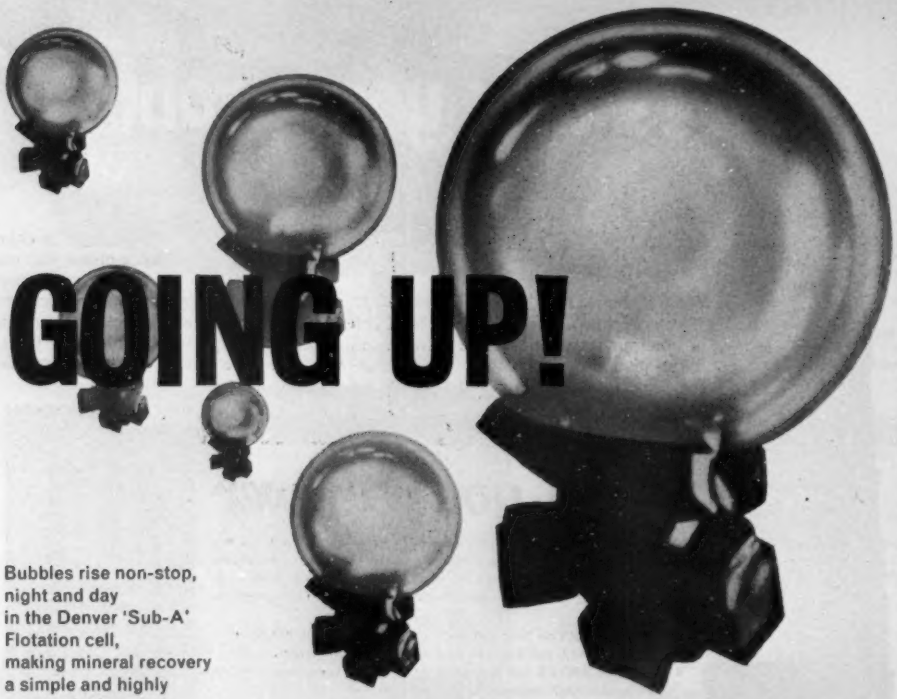

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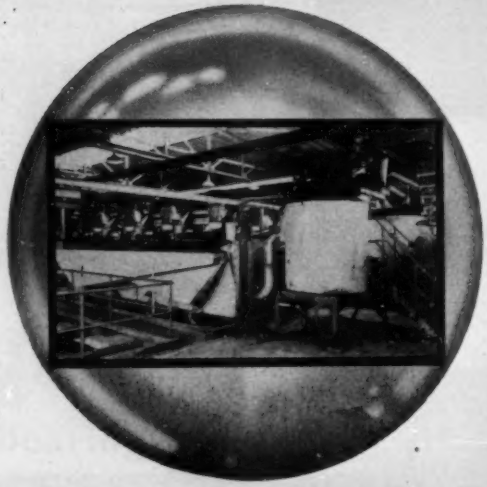
Bubbles rise non-stop, night and day in the Denver 'Sub-A' Flotation cell, making mineral recovery a simple and highly economical process.

The Denver cell can be used as rougher, cleaner or re-cleaner with greater flexibility and maintenance of economic recovery despite ore variations.

Over 30,000 Denver cells are proving their worth daily under arduous operating conditions all over the world. Denver's vast practical experience is readily available to you if you have a problem on mineral recovery.



Shown in the illustration is one of three Denver 4 cell No. 30 flotation machines installed by NCB in a North Eastern Divisional Colliery. To the right of the illustration is a 5 ft. x 5 ft. Conditioner.

(Photograph by Courtesy of NCB).

More information? Send for Bulletin F10/B81

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Britain's foremost builders of Steel-making Plant

now offer the

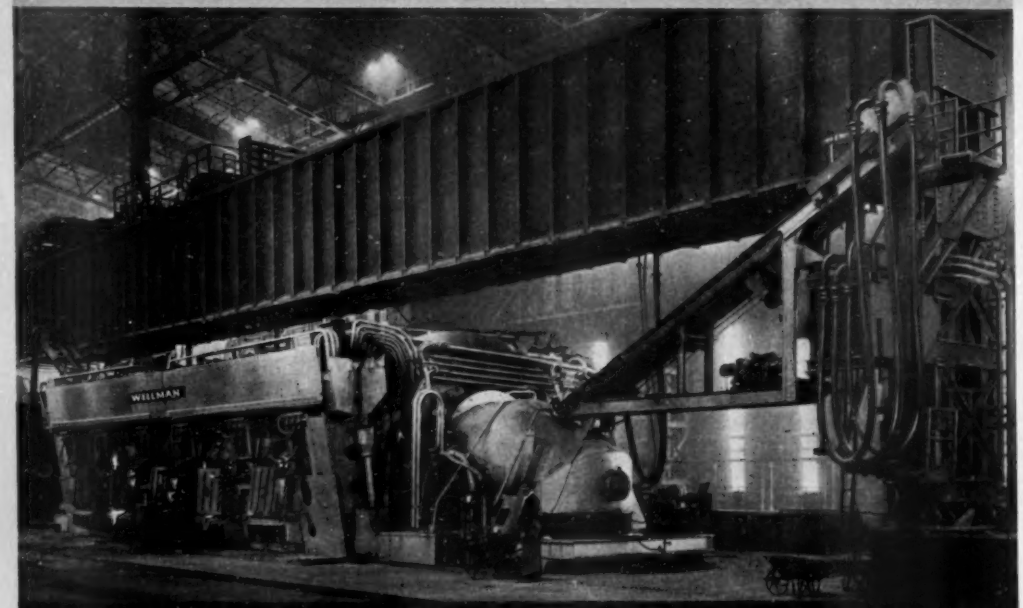
AJAX Oxygen Steel-making Operation

This new steel producing technique has been incorporated in the furnace illustrated. It was invented and developed by Appleby-Frodingham Steel Company, and has already produced over ½ million tons of ingots. A second unit has now been commissioned.

Outputs have been greatly increased with an average of five thousand tons of steel per week.

This Furnace has now 90% availability together with lower than normal refractory costs.

As licensees we invite you to consult us for either converting existing plant or providing new furnaces incorporating the Ajax Oxygen Steel-making Operation.



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A full range of equipment is available specially designed for use in mines. Schemes can be presented embracing complete interlocking of points and signals to ensure safe operation of traffic in all directions. Centralised or localised control, or automatic control, can be provided, the whole or part of an installation and, in cases where partial interlocked control only is desired, equipment can be supplied to satisfy the client's particular specification of the degree to which he would expect it to provide for traffic protection in given circumstances.

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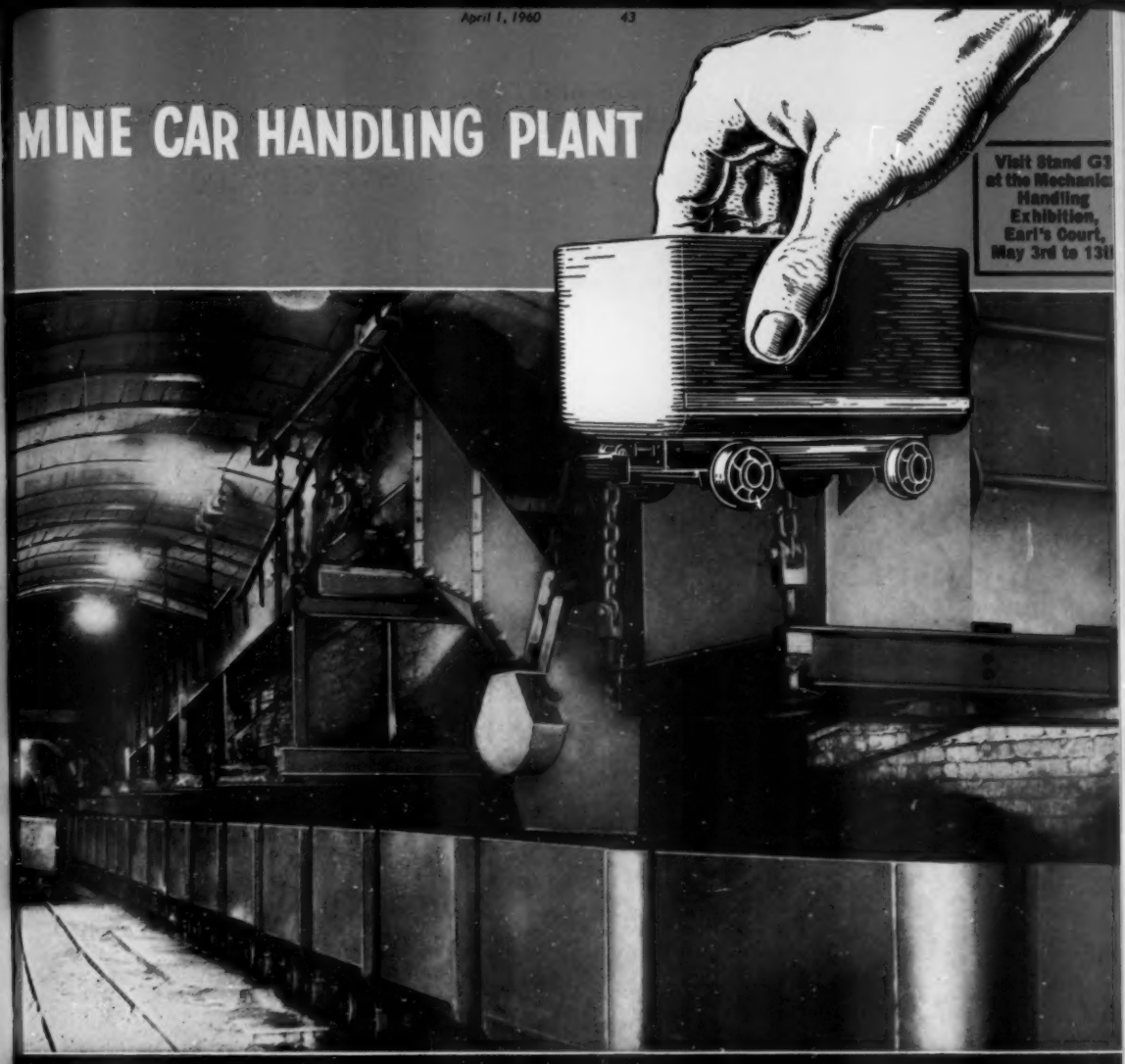

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Completely hydraulically operated, Sutcliffe mine car handling plant has all the advantages inherent with oil hydraulics — savings in manpower, savings in horsepower, self lubrication, increased efficiency. Individual items of equipment such as tub stops and retarders or the engineering of complete installations, receive the forethought and service for which the Sutcliffe organisation is so well known.

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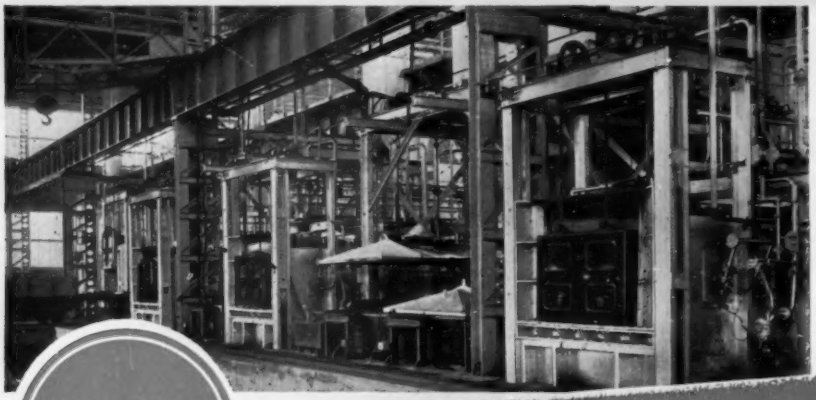

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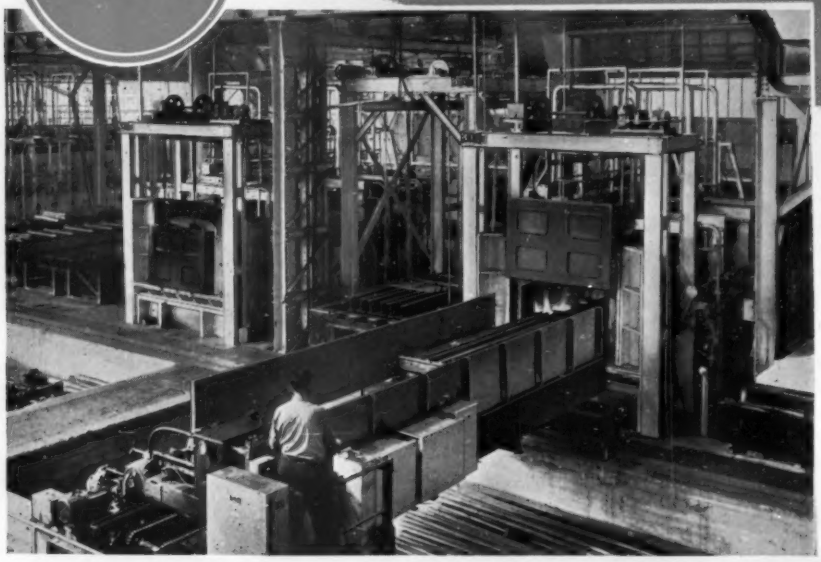

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The illustrations show a battery of 3 Heat Treatment Furnaces, one with recirculation, 5 ton 3 peel charging machine, fixed and mobile quenching equipment. This plant, installed at the Stocksbridge Works of Samuel Fox & Company Limited, also includes two Bogie type Furnaces with special transfer charging machine

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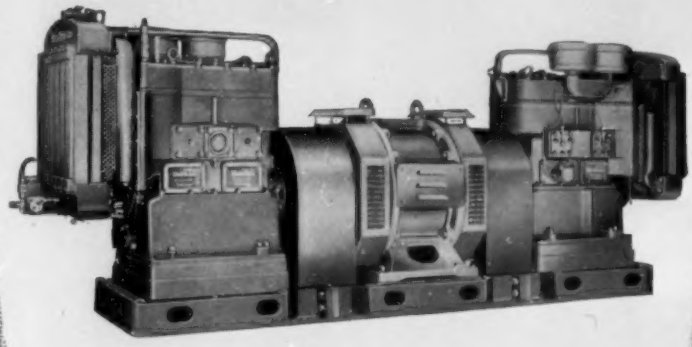

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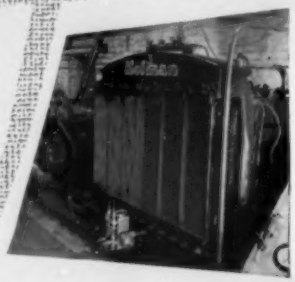

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Ideal for in-bye use

Holman design, Holman strength, Holman *efficiency*—you get all these in this new stationary compressor arrangement. And you will find something more—the Duplex set allows almost vibrationless running.
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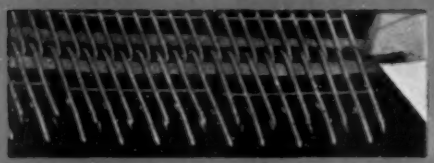
Twenty-one years ago, "Comet" fasteners were the first to feature a bar—the "Master-Bar"—to guarantee perfect pitch on a unit of hooks. In such a critical matter as the fastening of conveyor belts the fact that "Comet" had the know-how then, and have since gained tremendous experience in the use and application of the "Master-Bar", is of vital importance to you as a user.

2



THE DOUBLE ROW OF HOOKS

"Comet's" distinct double row of hooks obviates the 'hinge action' which must occur when hooks are in line, or nearly so. "Comet" fasteners do not perforate and break the belt.

3

THE DOUBLE HOOK BEND

The complete hook formation achieved in the belt by "Comet" fasteners is not only unique—it is the strongest, most secure formation (and the least likely to pull out)—of any system anywhere

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The Huwood ML/6 Loader at a Northumberland Colliery. Huwood T.C.R. props on the face.

Large Coal

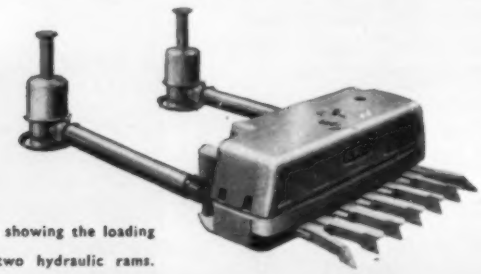
— but characteristic of the

HUWOOD ML/6

HYDRAULICALLY PROPELLED LOADER

when used with Cardox, Airdox or other airbreakers

HUWOOD



The ML/6 Loader, showing the loading flights, and the two hydraulic rams.

Head Office & Factories: HUGH WOOD & CO. LTD., GATESHEAD-ON-TYNE, 11.
Telephone: Low Fell 76083 (5 Lines). Telegrams: Huwood, Gateshead.

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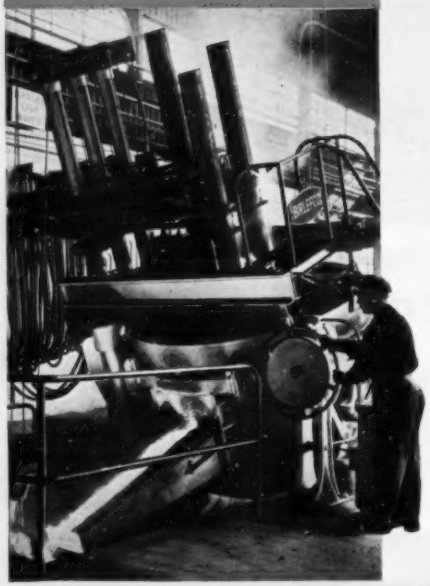
Ref. No. LL/FA/154

SEPTEMBER 1959

Record Month for Electric Steel

In September 1959, for the first time in this country, electric steel production surpassed a weekly average of 30,000 tons. Furthermore, also for the first time, electric steel production exceeded 7% of Britain's total crude steel production. A substantial proportion of this output is accounted for by the five largest electric arc furnace installations in the country, commissioned by Birlec and Efco between 1954 and 1959. Nevertheless, the bulk is made up of small foundry units ranging in capacity from 3 tons to 10 tons, such as this recently installed 3 ton Birlefco arc furnace at Ferranti Limited, Hollinwood, Lancashire. Rated at 1600 kVA, the furnace is used for recarburising offcuts of high silicon iron strip for the production of special cast irons. It went into operation in September 1959 and is contributing to the steady increase in the volume of Britain's electric steel output.



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IRON & COAL TRADES REVIEW

APRIL 1, 1960

Vol. 180

No. 4,785

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Organ of the National Association of Colliery Managers and the Association of Colliery Managers in India

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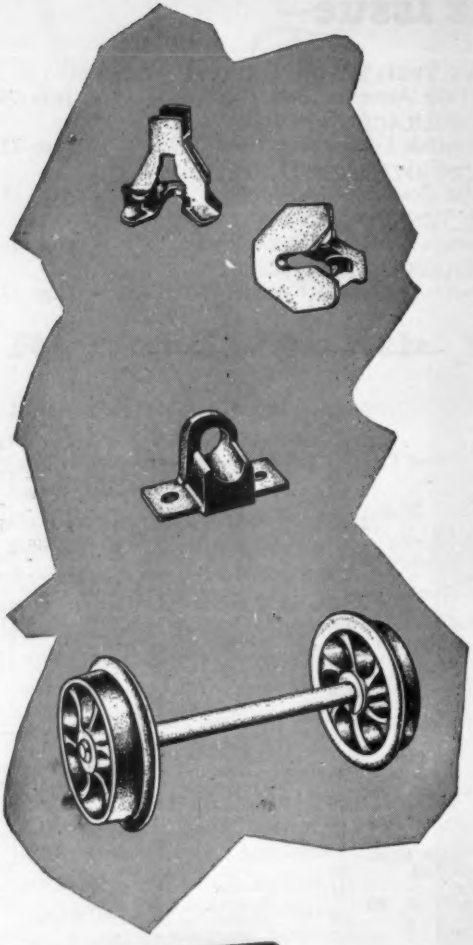

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IRON AND COAL
TRADES REVIEW

Vol. 180 April 1, 1960 No. 4,785

Aid Brings Trade

ARE we wise in assisting the economic development of other countries? Do we not run the risk of damaging our own industries by reducing our markets in those countries and by provoking competition from low-wage goods, here and in third markets? The Government is in no doubt about the answer. It has just published a White Paper showing the scale of assistance from the United Kingdom to development oversea, and it wants more of it, not less. Commenting on the White Paper, the Information Division of the Treasury points out that the raising of standards in the less-developed countries of the world is likely to be one of the great influences of the 1960s. Apart from humanitarian and political considerations, it is in Britain's economic interest to assist the movement. We cannot try to reverse what is a natural historical process by some Canute-like attitude—hoping that other countries' development will recede to suit our present pattern of production and exports. The healthy attitude is to recognize history and to be flexible enough to meet its changes.

The implications for British industry are important. The United Kingdom is a substantial exporter of both capital goods and manufactured consumer goods. The most obvious demand that newly developed countries abroad express is for capital goods, and assistance is often needed to finance these imports. But the potential growth of trade does not stop there. "The newly developing countries may, it is true, cut back at first on imports of some producer goods which they can now produce—and even begin exporting them: but they are at the same time broadening their industrial base, raising their appetite for many other types of industrial and consumer goods," the Treasury remarks. It is a striking fact that the trade which has grown fastest in the last eight years is that between industrialized countries, for all types of capital and consumer goods. It must be concluded that the process of industrialization abroad is of great potential value to British trade. To reap the full benefit we must continue to make finance available to the developing countries, to give them aid as well as trade.

Here the Treasury has a word of warning on the subject of prices. We are not alone in providing aid to the less-developed countries and it is vital that we should be able to maintain our competitive position in the export markets. Including private investment, the UK is putting something of the order of £250,000,000 a year into these territories. Ability to maintain, and if possible to increase, this effort depends on keeping the UK economy itself developing soundly. As the White Paper concludes: "The export trade will need to expand at a rate sufficient to provide an adequate margin of funds to be used for oversea assistance without calling on the gold and foreign currency reserves. The growth of other demands on the United Kingdom's rising production must not exceed a rate which leaves sufficient goods available for this increase in exports, and the general level of prices here will have to be such that oversea orders for these additional goods will be readily obtainable."

Costs of production tend to increase. The shorter working week in the engineering and shipbuilding industries inevitably will hoist costs, and a further increase is likely to follow the proposed raising of expenditure on the social services. The warning contained in the White Paper ought to be taken seriously by organized labour. Note of it will doubtless be taken by the Chancellor in framing his budget.

North-Eastern Divisional Coal Board Appointments

SINCE November, 1958, deputy production director for the No. 1 (Worksop) Area of the North-Eastern Divisional Coal Board, Mr. H. M. Spanton becomes deputy production director (operations) for the division. Mr. Spanton, who was born in 1924, worked at Monk Bretton Colliery before vesting date when he became assistant planning and mechanization engineer for the No. 5 (South Barnsley) Area.

Later he held appointments as assistant manager at Barrow Colliery, manager at Ledston Luck Colliery, agent of Brodsworth Main Colliery, and group manager for Brodsworth Main and Bullcroft collieries.

Mr. G. A. Corden, deputy production manager for the No. 7 (Wakefield) Area since June, 1955, becomes Area production manager and is succeeded by Mr. D. Hinchcliffe. Mr. Spanton is succeeded by Mr. J. R. Hunter, divisional planning engineer.

After obtaining a degree in mining at Leeds University Mr. Corden gained experience at Rothwell, Haigh, and Lofthouse collieries. He was appointed director and manager of Lofthouse Colliery, Limited, in 1943 and became deputy Area general manager in 1947.

Mr. Hinchcliffe began work for the New Sharlston Collieries Company, Limited, at the age of 15 and on nationalization was appointed undermanager at Sharlston West Colliery. He has since held the posts of manager and agent of Old Roundwood Colliery and manager of "B" Group in the Wakefield Area. Mr. Hunter went to the North-Eastern Division from the East Midlands Division (where he was manager of Ireland Colliery) to become agent at Thorne Colliery in 1954.

Passing Thoughts . . .

THIS union set its rules out nearly four years ago and I see no reason to change them. It was said then that one of our objects is to recruit and organize the people working in industry with the object of controlling the industries in which our members are employed—and if that does not say nationalization and public ownership I do not know what it does say.—MR. FRANK COUSINS, general secretary of the Transport and General Workers Union.

It is wrong to assume that there must be two sides of industry and that they must be in opposition. That is an outmoded idea.—MR. EDWARD HEATH, *Minister of Labour.*

A century of ramshackle growth lies behind the present inter-union disputes about trivialities, the struggle for differentials, the indiscipline of small groups and individuals, and the remoteness of the leaders from the led which so often paralyzes active control.—Daily Telegraph.

It will be some time before one can pronounce on the success or failure of the 42-hour week. What is clear, however, is that both employers and unions want it to succeed and that it is in the interests of both that it should do so; and this in itself is the best guarantee that it will.—Financial Times.

A depressingly large number of employers cannot, or will not, accept that they must move with the times and keep abreast of the great technological strides now being made in all directions.—MR. E. J. HUNTER, chairman of Swan, Hunter, & Wigham Richardsons, Wallsend-on-Tyne shipbuilders.

Paradoxically, the more emancipated the worker becomes from the fears and exploitations of the past, the more paternalistic he expects his employer to be.—Birmingham Post.

The Coal Board gives me the impression that it is afraid of the miners. The miners as servants of the public should be put under compulsory arbitration in regard to conditions of service and their wages. The rule should be: good output—good wages; poor output—poor wages.—Letter in the Birmingham Post.

The working girl's best friend is her trade union. In fact most young girls would be better off with a trade union card than with a wedding ring.—MRS. MARGARET MCKAY, *women's officer of the* TUC.

The way the coal industry is run today no wonder that coal consumption has dropped. At £7 to £8 a ton, the price of coal is ridiculous, especially when you live in a district that is cluttered up with coal mines.—CLLR. ERNEST BRACKENBURY, Blackwell (Derbyshire) Rural District Council.

We need a defence against planning with a big P.—LORD PIERCY.

Before the benefits of any great expansion of research can be fully utilized [in the machine-tool industry] there is a very pressing demand for educational facilities so that technicians are available who will be able to utilize the findings of the research programmes. —MR. ROBERT W. ASQUITH, chairman of the Asquith Machine Tool Corporation, Limited.

Why not introduce a comprehensive training scheme which would enable an apprentice to broaden his outlook by spending a few months with some other firm studying their methods and practices on an exchange basis?—Letter in the Journal, Newcastle-upon-Tyne.

Great Britain . . . stands second to none in the quality of the representatives it sends abroad. But without the right prices for equipment, which meets the standards of quality the customer requires, delivered at the right time and serviced to the required extent subsequent to installation, he may as well stay at home.—MR. A. H. FRAMPTON, in a paper to the British Institute of Management.

Rising prices are merely the measure of inflation, not the cause of it; rising prices cause inflation like wet streets cause rain.—MR. ROGER M. BLOUGH, *chairman of the United States Steel Corporation.*

If I have the honour to be in the House in 1975 when the last amount on the loan [to Colvilles, Limited] is due and if the money has not been repaid in full, I will undertake to bring my hat into the House and eat it in the presence of the then Speaker.—MR. HAROLD LEVER, Labour MP for Cheetham, Manchester.

The impression left by the [steel loans] debate shows the general view to be "You have got away with it this time; but don't do it in this way again." —The Daily Telegraph.

The figures of juveniles entering the industry during the last six weeks suggest that any feeling that the mining industry has no future is now dead.—From "Topics of the Day" in the Guardian Journal, Nottingham.

Conference Urged to Discuss Mine Disasters

RESOLUTION calling for a conference to discuss recent mine disasters in Yorkshire, Lancashire, and Scotland is to be put before the 50th annual conference of the National Association of Colliery Overmen, Deputies, and Shotfirers, which opens at Torquay on Wednesday. The resolution has been tabled by the Yorkshire Area of the association.

The disasters are those which occurred last year at Walton, Hemsworth, and St. John's collieries in Yorkshire, at Bickershaw in Lancashire, and at Auchengeich in Scotland.

Another Yorkshire resolution calls for resistance at national level to any change in legislation which would permit a workman to carry a relighter safety lamp for general use. At present this kind of lamp is issued only to underofficials.

Give Me Your Answer Do Challenge to Chairmen

CHALLENGE to a penny-farthing bicycle race has been thrown out to any company chairman whose firm celebrates its 200th anniversary this year. The challenge is issued by Mr. S. Martin de Bartolomé, chairman and managing director of Spear & Jackson, Limited, sawmakers, etc., of Sheffield.

If there are any comers, the race would be part of the company's own 200th anniversary celebrations in June. Mr. de Bartolomé has himself never ridden a penny-farthing.

The task of finding machines for the race has been given to Mr. Remington Wilson, a director of the firm.

COAL INDUSTRY CONTRACTION

TUC Leaders in Talks with Minister

PLEA for help for the contracting coal-mining industry was made by a deputation of Trade Union Congress leaders in talks with the Minister of Power, Mr. Richard Wood, and the Parliamentary Secretary to the Ministry, Mr. John C. George, on Thursday of last week. The deputation emphasized the need for new industries in affected areas and for giving help to the coal industry which had "suffered financially" by being run for many years as a social service.

It was also urged that the electricity industry should be encouraged to re-convert from oil-firing to coal in certain power stations. The deputation stressed the danger of a permanent loss of manpower from deep mining and underlined the importance of domestic coal production in relation to the balance of payments.

The Minister said he shared the concern about the coal industry's difficulties, but he saw no reason why the target set in the National Coal Board's Revised Plan for Coal should not be achieved. The Government had co-operated with the board to ensure that the necessary contraction did as little damage as possible to the industry and its workers. The number of men now unemployed as a result of 1959 pit closures was about 1,200. He said that few industries had a lower level of unemployment.

"Hopeful" About Outcome

The executive of the NUM decided on the same day to refer to arbitration its claim for another 12s. a week for 300,000 day-wage men. The NCB had already stated that it could not agree to the demand, but union leaders asked for time to consider what the board said about the state of the industry, in the hope of finding grounds to extract an offer. The union has now decided there would be no point in continuing negotiations with the board.

The union's claim for a shorter working week for all members—a seven-hour day for those underground and a 40-hour week for surface workers—has already been referred to the industry's tribunal. Hearings will begin on April 27 and if they take more than one day will be resumed on May 8. The tribunal is expected to make its awards after a separate consideration of the two claims.

Mr. W. E. Jones, president of the NUM, commented after the executive meeting that the union could not support requests made by the owners of licensed mines that their production should continue unrestricted this year. He said that licensed mines were those remaining in private ownership when the greater part of the industry was nationalized. The attitude of the union was that it would be unfair to men in the rest of the industry to exempt licensed mines from the general contraction in coal output, even though most of the workers were union members.

CEMENT AND PLASTER model of a miner working at the coal face in the Barnsley Main Seam, made by Mr. George Hector, who was disabled at Nunnery Colliery (Yorks) five years ago, was dedicated at York Minster on Sunday.

NCB "Pricing Itself Out of the Market"

POLICY of the National Coal Board was pricing the gas industry out of coal into oil, and itself out of markets worth ultimately 100,000,000 tons of coal a year, said Mr. W. Hodkinson, deputy chairman of the North Western Gas Board, at a meeting of the Manchester and district section of the Institution of Gas Engineers last Friday. Taking part in a discussion which followed an address by Mr. Frank Wilkinson, NCB director-general of marketing, Mr. Hodkinson questioned the estimates on which the plan for coal relied.

He said: "You rely on a future in electricity for the next 20 years, but I do not think you will have a future there after that." He suggested that smokeless fuels might prosper for 20 years, but that the real future lay with piped or wired supplies of energy. In 10 or 20 years, the steel industry would not be using hard coke for making iron, and this would mean the loss of another market for coal. "Your future lies best in supplying a convenient fuel and that is through a pipe. We believe your present pricing policy is preventing that," he said.

Earlier, Mr. Wilkinson said that the NCB believed that electricity power stations would be taking more coal in 1965 than last year, and that there would also be a gain from the iron and steel industry.

There was more comment on Monday from the gas industry about the price of coal. Speaking at a luncheon to mark the opening of a "Gas at Work" exhibition in Harrogate, Sir Henry Jones, chairman of the Gas Council, said: "We in the gas industry have gone on for 150 years mainly on the basis of carbonizing coal. We wish to keep the gas supply system of the country with big central works based upon coal, which I hope will be cheap enough.

"If not, other materials will be used. We are looking as a team to keep costs down."

Miner Killed by Pit Roof Collapse

FEW minutes after being inspected, an underground roof at Coppice Colliery, Heath Hayes, collapsed, killing Mr. Henry Evans (50) and seriously injuring two others, a Brownhills inquest jury was told on Thursday of last week. A verdict of Accidental Death was returned.

The two injured men said they were helping Mr. Evans to erect a girder when the roof collapsed without warning. It had just been tested and appeared to be safe, they said.

Iron and Steel Institute's New President

ASSISTANT managing director of the Steel Company of Wales, Limited, Mr. William Frederick Cartwright, is to be president of the Iron and Steel Institute for the year 1960-61.

He will take over from the retiring president, Mr. William Barr, at the institute's annual meeting in London on May 3.

MR. W. F. CARTWRIGHT

Mr. Cartwright, who was born in 1906, began his technical training in 1925 when he entered the Swindon works of the Great Western Railway. Three years later he joined Guest, Keen & Nettlefolds, Limited, at its Dowlais Works and in 1931 was appointed assistant works manager at the Port Talbot Works of Guest Keen & Baldwins Iron & Steel Company, Limited. Four years later he became technical assistant to the managing director, a position he held until 1940.

During this period he was closely concerned with the reconstruction and enlargement of the company's East Moors Works. He was appointed chief engineer in 1940 and at the same time elected a director and three years later became general manager of the Margam and Port Talbot works.

When the Steel Company of Wales was formed in 1949 Mr. Cartwright joined the board and became general manager of its steel division. It was under his leadership that the development of the Abbey Works at Port Talbot was carried out. He was appointed to his present post in 1954. He is also a director of Davy-United, Limited.

A member of the Iron and Steel Institute since 1936, Mr. Cartwright was the first chairman of the Engineering Committee following its establishment in 1946. He was elected a member of the council in the same year and became a vice-president in 1955. He was awarded the institute's highest honour, the Bessemer Gold Medal in 1958.

AEI Group Activities

FIRST annual review since the completion of the reorganization of the trading activities of Associated Electrical Industries, Limited, shows an increase in sales of 14¼ per cent. and an increase in trading profits of 6¼ per cent. Over the past 10 years AEI sales have risen from £57,000,000 to £208,000,000, while the trading profits have slightly more than doubled.

Orders received during the year increased to £182,000,000 (£168,000,000) and year-end orders in hand were valued at £173,000,000 (£182,000,000).

Much interesting information was collected on research on the wear of metals both in normal friction and in metal cutting. It has proved possible to redesign the shape of tools to give longer life and to make an evaluation of new metals for cutting tools.

New Company Formed for Peace River Project

DEVELOPMENT of a new engineering company, International Power & Engineering Consultants, Limited, of Vancouver, has been agreed upon in principle. The organization is an outgrowth of BC & BB Power Consultants, Limited, formed in 1958 to carry out detailed engineering work on the Peace River hydro-electric project in British Columbia.

Through its subsidiary, British Columbia Engineering Company, Limited, the British Columbia Power Corporation, Limited, of Vancouver, held a 51 per cent. interest in the company, and Balfour Beatty & Company, Limited, of London, E.C.4, held 49 per cent. The new company will be owned on a 50-50 partnership basis between British Columbia Power and Balfour Beatty.

Chairman of the new company will be Sir Andrew MacTaggart, chairman of Balfour Beatty, Power Security Corporation, Limited, and also of Peace River Power Development Company, Limited, and Mr. A. E. Grauer, president of British Columbia Power and British Columbia Electric, will be deputy chairman. Mr. Tom Ingledow, vice-president of British Columbia Power and president of British Columbia Engineering, has been named president. Other directors are:—Sir Thomas Foy, Mr. K. H. Kidd, Mr. R. H. R. McGill, Mr. W. I. O'Hara, Mr. Henry W. Smith, and Mr. Jack H. Steede. The company will be staffed by engineers who have carried out several mechanical and hydro-electric works for the Aluminium Company of Canada, Limited, British Columbia Electric, and others.

Proposed Industrial Safety Lessons for School-leavers

SO that lads of 15—"some of whom may be possessed of more brawn than brain"—do not enter industry in complete ignorance of the day-to-day risks involved in the workshop, Steel, Peech & Tozer branch of the United Steel Companies, Limited, has suggested that lessons in industrial safety should feature as an extra subject during the last school term.

Commander I. G. Steel, the firm's welfare officer, said: "You can't start too early on this subject. We have held such things as one-day courses for teachers on industrial safety, so that we can get the teachers safety-minded, too. We have not proposed it should be a full subject, such as arithmetic or English, but the suggestion is that the safety message should be put over in all practical subjects, and be remembered in discussions on careers and similar talks which are given to boys in their last term at school."

The annual report on safety in the United Steel group, which employs 36,000 workers, shows that the risk of accidents to individual employees in steel-making branches is now less than two-thirds of that in 1950.

DROP of 11 per cent. in coal shipments from the port of Seaham (Co. Durham) was reported on Saturday at the annual meeting of Seaham Harbour Dock Company, Limited. Mr. H. C. C. Wilson, vice-chairman, said that in the year ended December 31, 1959, coal shipments amounted to 1,455,857 (1,642,337) tons.

In Parliament

STEEL LOANS BILL PASSED

But Criticism Comes From All Sides

CRITICISM from both sides of the House of Commons on the Government's industrial financial policy marked the third reading on Monday of the Iron and Steel (Financial Provisions) Bill. The Government's policy was nevertheless approved without a division and parliamentary sanction was thus given for state loans totalling up to £120,000,000 to Colvilles, Limited, and Richard Thomas & Baldwins, Limited, for new steel mills at Ravenscraig, Scotland, and Llanwern (Mon), respectively.

Both the PRESIDENT OF THE BOARD OF TRADE, Mr. Reginald Maudling, and the MINISTER OF POWER, Mr. Richard Wood, renewed undertakings to give proper opportunity for debate on the course of the projects as they came to fruition. The chief critic from the Government's back benches was again MR. GERALD NABARRO, who accused the Ministers responsible for the Bill of "inherent artfulness" in framing it so that he could not vote against it without advocating breaking the contract with the steel firms.

Moving the reading, MR. MAUDLING said that no one could seriously argue that it would have been possible at the time of the agreements with the two firms to finance expansion of the kind in question from the private resources of the market. Had the Government not agreed to provide the money, the project would have been seriously delayed, which would have been a bad thing for industries using sheet and strip mill products. These transactions were now, and at the time, in the national interest. There was, in the arrangements being made under the Bill, full protection for the public purse and the rights of Parliament, he said.

"No Safeguards"

MR. FREDERICK LEE (Lab.) said the Government had managed to produce a Bill for which nobody in the House could find a good word, but which would, nevertheless, pass to the statute book. He claimed there were no safeguards at all in the use of public money, no assessors, no provisions for the equitable distribution of profits, no representation by Government-appointed directors, and no provision to enable the House to insist on the Government coming back for parliamentary sanction on any point.

MR. NABARRO said the Bill had been subjected to virulent and valid criticism from every quarter of the House. He looked at the reasons which prompted the Government in this "extraordinary mixture" in one Bill of voting money to a public company on the one hand and a private company on the other. All Conservatives were apprehensive about the growth of State paternalism, but he would not vote against the third reading because he believed overwhelmingly in the sanctity of contracts. "In future," he said, "we shall not be confronted with a *fait accompli*. We have learned a salutary lesson about demanding a debate before money is granted and not being placed in the invidious situation in which we have found ourselves throughout the proceedings on this Bill."

Another Conservative critic, MR. JOHN BIGGS-DAVISON commented that it was not long ago that Conservatives and leaders were resisting the back-door nationalization policy put forward by the Opposition at the General Election. He went on: "My friends and I will go on resisting back-door nationalization, but it will be very hard indeed to resist it if the Government feels it has to go on putting further measures of this kind before the House."

MR. JOHN DIAMOND (Lab.) described the Bill as a plain breach of trust, which approved the lending of money to Colvilles by the Government on terms far more onerous to the nation than need have been, while MR. HAROLD LEVER (Lab.) said it was ridiculous to paint Colvilles as a recipient of public assistance or criticize the company for accepting the offer. It was not a bloated, profit-making capitalist seeking to add to his own bloated profits at the expense of public money, but rather a public-spirited capitalist being pressed by a Tory Government to undertake work of a particular character, not wholly to his taste, in Scotland, he said.

The Minister of Power said he had given an undertaking that there would be no application elsewhere of the money. He did not see that there could be any doubt that, if his undertaking were accepted, this loan would only be used to assist Colvilles and Richard Thomas & Baldwins to do the job set before them.

Talks to Resume on Fate of Licensed Mines

NEGOTIATIONS are to resume between owners of small mines and the National Coal Board over the board's proposals on reduced output, said the MINISTER OF POWER, Mr. Richard Wood. He declined to be drawn by a series of questions on the fate of licensed mines, saying: "I think the House will agree that these negotiations are more likely to be successful if I do not comment further."

MR. STEPHEN DAVIES (Lab.) asked for a statement from the Minister on the grounds that the conditions about to be imposed would close down many small mines and render thousands of miners unemployed, and MR. STEPHEN SWINGLER (Lab.) urged the Minister to direct the NCB to suspend any decisions about the future of licences pending a national conference to discuss the question.

After hearing from the MINISTER that the board

was willing to resume negotiations as soon as approached by small-mine owners, MR. DAVIES commented that the board had been infinitely more heroic at the expense of these very small mines as compared with its attitude to the vast open-cast schemes which had put thousands of miners into the ranks of the unemployed.

MR. SWINGLER said that the proposal made at any rate in North Staffordshire was to impose a very much heavier cut in the production of small mines than of the coal industry generally. This would put out of work many older, partially disabled mineworkers who would find it difficult to get other jobs. Was the Minister saying that negotiations would be resumed without specific conditions? MR. WOOD replied that the terms for negotiations were for the two bodies and not a matter for him.

Another questioner, MR. WILLIAM BLYTON (Lab.) suggested that if private mine owners did not take their share of the burden, it would mean further closures in the big collieries, while MR. FREDERICK LEE (Lab.) invited the Minister to agree that it might not even be a question of the closure of small mines. "Is it not a fact that the board has had a huge job to do of stocking coal and it might be suggested that the small owners should do a share of the stocking as well?" he asked. "If there is any question of unemployment among people working in the small mines, certainly in many instances the board would be prepared to employ them."

Alarm Over Methane Imports

FUTURE development of liquid methane imports would be the death sentence of the Durham coalfield and many people employed in the gas industry would become unemployed, said MR. WILLIAM BLYTON (Lab.), during the debate on the third reading of the Gas Bill. He said that the large modern collieries in Durham had 100 years' reserves of coking coal. "The production at those collieries will be affected if the contemplated imports of methane are sanctioned, and the manpower will be still further reduced. The coal will be left in the ground and our miners will be unemployed."

The MINISTER OF POWER, Mr. Richard Wood, said the coking coal position in Durham was being watched with immense care. There were a number of situations in which methane importations would not necessarily lead to a reduction in the use of coal. It could be beneficial to the coal industry.

MR. CHUTER EDE (Lab.) spoke of the "very deep anxiety" brooding over areas where coal had been mined for a very long time for the production of gas. In support, MR. NESS EDWARDS (Lab.) said that South Wales was as much concerned as Durham. Referring to the new steel plant of Richard Thomas & Baldwins, Limited, at Llanwern (Mon), Mr. Edwards continued: "This, I am told, will produce so much gas that it will knock out many of the generating plants in the Midlands. It is no use bringing in methane gas if the gas from the coke ovens is to become surplus."

MR. FREDERICK LEE (Lab.) moved an amendment (later withdrawn), calling for adequate financial provision for a comprehensive programme of research into the technical and commercial possibilities of the total gasification of low-grade coals.

Replying, MR. JOHN C. GEORGE, Parliamentary Secretary to the Ministry of Power, said it would be a risk to advance on the present Lurgi plants before fuller experience had been acquired. They must be built where there was a large, adequate supply of cheap coal. "Therefore, we cannot paint a picture of the plants spreading all over Britain, but the evidence is that everyone concerned is seized of the importance of extending research into the use of low-grade coal by gasification."

SHIPBUILDING PROSPECTS

CHAIRMAN of the Shipbuilding Advisory Committee, following the recent resignation of Sir Graham Cunningham, will be the Permanent Secretary to the Ministry of Transport. This was announced in the House on Wednesday by MR. ERNEST MARPLES, Minister of Transport, who answered a number of questions concerning Sir Graham's resignation. The committee, he said, would have the same terms of reference and membership as before. Representatives of both sides of the shipbuilding industry had agreed that a sub-committee should be set up to consider the future of the industry.

"I am more anxious to get both sides of the industry together with constructive proposals for the future than to issue condemnation about the past," said MR. MARPLES when MR. AUSTEN ALBU (Lab.) asked, whether in view of the serious criticisms and obscurantism on the part of the employers made by Sir Graham and by a director of a shipbuilding firm in a recent article in The Times, and criticism of the industry's technical competence made by the Minister of Science, he thought it time the Government intervened in the affairs of the industry in the same way as some other industries.

SMOKELESS FUEL SUPPLIES

TOTAL supplies of solid smokeless fuel, including coke, are sufficient to allow the implementation of clean air schemes, said the PARLIAMENTARY SECRETARY TO THE MINISTRY OF POWER, Mr. John C. George, in reply to a question by MR. NESS EDWARDS (Lab.). This was one of three written replies given by Mr. George on the subject of smokeless fuel supplies.

MR. SYDNEY IRVING (Lab. & Co-op.) asked about the "present difficulty" restricting "Coalite" production, which was, he said, well below demand. MR. GEORGE said the production was a matter for the makers, Coalite & Chemical Products, Limited. Other kinds of solid smokeless fuels were available in sufficient quantities to meet demands, including the requirements of smoke control areas.

Replying to MR. NORMAN DODDS (Lab. & Co-op), MR. GEORGE said he was unaware that the North Thames Gas Board had difficulty in obtaining enough of the coal range suitable for the manufacture of "Cleanglow." Last year the board sold 187,000 tons of "Cleanglow"; this year expected sales were about 250,000 tons. In addition, the board had ample supplies of other types of coke for sale. Mr. George added that separate figures for other smokeless fuels were not kept for the board's area.

COAL-FIRING OF POWER STATIONS

QUESTIONS about the coal-firing of Littlebrook B and Brunswick Wharf power stations elicited little positive information from the MINISTER OF POWER, Mr. Richard Wood. He said that discussions were still in progress and that it would not be right to comment in detail at that stage.

MR. ALAN FITCH (Lab.) asked whether the Minister was aware that any decision to change to oil-firing would cause the greatest dismay in the coal-mining industry, and invited him to see that this did not happen in view of the amount of coal stocked.

Another questioner, MR. FREDERICK LEE (Lab.) sug-

gested that the Minister had intimated that the Electricity Authority wished to revert to coal-firing in many stations which had been on oil. "Here we have two stations which have never been off coal, as I understand it; certainly they are on coal now. Would it not be a most retrograde step if at this stage they went on to oil-firing?" The Minister said he would take note of the remarks.

BETTER DISTRIBUTION

BETWEEN the pit head and the fireplace there is a multiplicity of factors, agents, middlemen, and retailers, said MR. WILLIAM WHITLOCK (Lab.). He was asking whether it was the Government's intention to implement the proposals of the Robson Committee for improving coal distribution efficiency. The MINISTER OF POWER, Mr. Richard Wood, said that the Committee's only recommendation in this regard related to the establishment of large, fully mechanized coal depots.

Asked by MR. WHITLOCK whether he had considered the suggestion of the Committee for an investigation into the possibilities of rationalizing the trade, the MINISTER said that his predecessor recognized an obligation to hold consultations about this matter. There were, however, a number of difficulties in face of the establishment of mechanized coal depots. He was perfectly willing to help in those discussions if they reached a point at which he could usefully help.

SPOIL HEAP IMPROVEMENT

AGREEMENT on minor improvements to seven spoil heaps in Lancashire has been reached between the local authorities and the National Coal Board, said the PARLIAMENTARY SECRETARY TO THE MINISTRY OF HOUSING AND LOCAL GOVERNMENT, Sir Keith Joseph. MR. ROY MASON (Lab.) suggested that the Minister might consider consulting the Minister of Power and the National Coal Board with a view to using spare open-cast machinery to make more improvements.

DR. BARNETT STROSS (Lab.) asked what assistance the Ministry proposed to give to local authorities, and mentioned that in many areas, like Stoke-on-Trent, spoil heaps occupy a large percentage of land space. Sir Keith suggested that Dr. Stross should put down a question on this subject.

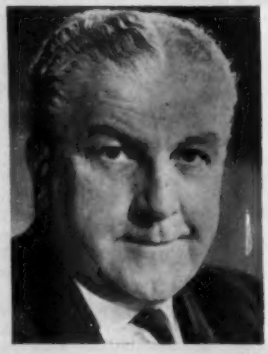
ASKED BY Mr. William Blyton (Lab.) whether there was any intention to relax the import restrictions of foreign coal into Northern Ireland, Mr. Frederick Erroll, Minister of State to the Board of Trade, said in a written reply that there was no prospect of any early change in present Government policy.

SPEEDY AND sympathetic consideration would be given by the President of the Board of Trade to any application he receives for the extension of the present exemption from import duty of sheet steel, said the Minister of State, Board of Trade in a written reply. He was asked by Mr. Gresham Cooke (Con.) for a declaration that sheet steel would continue to be imported duty free in 1961 to ensure the placing of long-term contracts abroad.

Mr. J. M. WILLSON has succeeded Mr. C. Jackson as manager of the Midlands area of Bowmaker (Plant), Limited. He joined the company in 1953 and became general service manager three years later. In addition to his new duties, he will retain co-ordinating control of the service technicalities throughout the company's area. Mr. KEITH ATKINSON has joined Bowmaker (Plant) to supervise the setting up of new premises at Cannock (Staffs) after which he will become service manager for the Midlands.

Guests at Cutlers' Feast Tour Thorncliffe Works

FOR two days this week, the Thorncliffe works of Newton, Chambers & Company, Limited, was "on show" to many of the guests of the Cutlers' Feast in Sheffield on Tuesday evening, and scores of other visitors besides. The Master Cutler this year is Mr. P. J. C. Bovill, managing director of the company. On Wednesday and again yesterday (Thursday), several hundred people toured the plant.



MR. P. J. C. BOVILL

Mr. Bovill presided at the Feast. The chief speaker was Lord Hailsham, Lord Privy Seal and Minister for Science, who asked how many of the major breakthroughs in the technological field would have been possible or would have developed at the present level but for war or the fear of it. Lord Hailsham said that this might seem to tell against his claim that war was the most reactionary force in history. But unfortunately technical advance and real progress were not necessarily synonymous.

Mr. C. H. T. Williams, Senior Warden of the company, and managing director of Park Gate Iron & Steel Company, Limited, said there must be a realization that prosperity was the fruit of industry and could come only from the efforts of the people themselves. He added that with world-wide industrial development, many oversea customers now provided much of their own needs and often competed with us. Yet for the maintenance of our living standards we relied more and more on our relations with these very people.

George Kent Sells Steering Gear Division

STEERING gear division of George Kent, Limited, makers of industrial instruments, etc., of Luton, is being sold to Cam Gears, Limited, also of Luton. George Kent has been making these products for Cam Gears for nearly 30 years. After the sale George Kent will hold 40 per cent. of the enlarged equity capital of Cam Gears.

The Ross Gear & Tool Company, one of the largest independent manufacturers of steering gears in America, will subscribe for cash 20 per cent. of the Cam Gears capital and the present holders of Cam Gears will hold the balance. It is stated that the reorganization will not affect the structure of George Kent's instrument and meter divisions.

THE Gateshead-upon-Tyne firm of wire rope manufacturers, Joseph Crawhall & Sons, Limited, has established a financial and trading relationship with the American rope firm, Broderick & Bascom Rope Company.

Redundant Workers' First Claim for Llanwern Jobs

SUGGESTION that the new Spencer steelworks of Richard Thomas & Baldwins, Limited, now under construction at Llanwern (Mon), would be manned by "green" labour has caused serious concern among steelworkers whose redundancy has already occurred or is imminent, said Mr. Henry F. Spencer, managing director of the company, last Friday. In an address at the annual dinner of the Ebbw Vale Metallurgical Society, Mr. Spencer stressed that redundant steelworkers and those likely to become redundant would be given first chance of jobs there.

He said: "I want to correct a bad misunderstanding. My attention has been called to a newspaper headline to the effect that the Llanwern labour will be 'green.' I regret such a misunderstanding and I say unreservedly that we shall give priority to any redundant or to-be redundant steelworkers. There will not, of course, be enough experienced steelworkers available to staff Llanwern, and some inexperienced staff will obviously have to be engaged."

Mr. Spencer went on to say that the recruiting of labour for Llanwern and wage arrangements would be done in consultation with the trade unions concerned. "We want to set an example in our behaviour with trade unions, civic authorities, and all institutions and people affected by the Llanwern works," he said. "No steps will be taken to weaken the claims, priorities, and prestige of the trade unions, which in our case have always shown themselves as responsible, experienced, and knowledgeable as our own management.

"They are not only an indispensable parts of wages and labour negotiations and agreements, but they are our responsible partners in production and productivity."

Referring to the plant to be put down at Llanwern, Mr. Spencer said that when size was mentioned, it was not in a boastful spirit, but as a guide to the factual measure of functional efficiency, technical advance, and economic desirability. "For one instance, the hot strip mill is designed and powered to make the best strip needed in the cheapest manner, and with the right techniques its capacity will exceed that of any hot strip mill now operating. Its capacity under the right conditions will exceed 4,000,000 tons a year," he said.

Mr. Spencer gave an assurance that the company's Ebbw Vale works would not be neglected when Llanwern came into operation. The two would be scheduled jointly so that both could work at maximum efficiency. "Ebbw Vale will not compete with Llanwern. It will be complementary to it," he declared.

MORE STANDS AT MACHINE TOOL EXHIBITION

MORE stand space will be available at this year's International Machine Tool Exhibition, organized by the Machine Tool Trades Association, at Olympia, London, from June 25 to July 8. Stand space has been increased by 21,117 sq. ft. to 287,204 sq. ft., compared with the last exhibition held in 1956, and there will be 295 stands available, against 261.

The number of standholders at present recorded is 266, and of the total number of exhibitors 107 will display British built metal cutting or metal forming machine tools. Foreign machines will be shown on the stands of 45 importing members of the association.

Metallurgical Editor of IRON AND COAL

APPOINTMENT of Metallurgical Editor of IRON AND COAL has today (Friday) been taken up by Mr. C. W. J. Crawford, since 1946 technical secretary of the steelmaking division of the British Iron and Steel Research Association.

MR. C. W. J. CRAWFORD

Mr. Charles Crawford, who is 49, was educated at Chester Grammar School and joined the metallurgical staff of John Summers & Sons, Limited, steelmakers, of Shotton (Ches), in 1928. In the ensuing 17 years he gained considerable experience particularly in the field of open-hearth plant metallurgy, and for the last five years of his appointment he was open-hearth plant metallurgist responsible for the collection and correlation of all steelworks data, the organization of special investigations, and liaison with the slabbing mill, strip mill, and sales representatives on steel quality.

As technical secretary of BISRA, Mr. Crawford has been occupied with the whole field of steelmaking in all its most modern developments and has visited most of the leading steelworks, not only in this country, but abroad He is also known to a number of technical societies and schools as a lecturer on metallurgy and steelmaking.

Mr. L. E. Mather Warns About Shorter Working Week

WARNING about the shorter working week for engineering employees, which began on Monday, was given by Mr. L. E. Mather, chairman of Mather & Platt, Limited, electrical engineers, etc., in his speech at the company's annual meeting in Manchester on Thursday of last week. He said that the company was an early pioneer of shorter working hours and had introduced a 48-hour week more than 60 years ago.

It proved possible then, he said, to achieve the same output in the 48-hour week as in the 54-hour week. To achieve a similar result under today's conditions would involve a considerable effort by management and workers, and a determination that the cost of production—and therefore selling prices—should not be increased.

Mr. Mather said there should be no misunderstanding as regards the increase of the cost of production involved in this reduction; no less money was being paid by engineering employers for 42 hours' work than had been paid for 44 hours.

RESOLUTION put forward by Clydebank No. 2 branch of the Boilermakers' Society for discussion at the society's annual national conference in Ayr from May 24 to 27, calls for a more rigid "safety code" in shipbuilding.

The Miner's Future

DIFFERING VIEWS IN ADJOINING COUNTIES

DIFFERING opinions on the future for miners in Nottinghamshire and their neighbours in Derbyshire were expressed by speakers last week. Mr. Peter Tapsell, Conservative MP for West Nottingham, reassured miners at the Radford, Wollaton, and Babbington collieries that their future was "all right," while across the county boundary, Mr. Bert Wynn, secretary of the Derbyshire Area of the National Union of Mineworkers, commented: "In the foreseeable future there seem to be no favourable prospects for Derbyshire mines."

Addressing the annual meeting of the West Nottingham Conservative Association, Mr. Tapsell said he had made careful inquiries from the NCB and had ascertained that Radford Colliery had a life of 20 years, Wollaton at least 10 years, and Babbington 40 years. "The lifetime of Radford and Wollaton collieries will be reduced if permission is not granted to the working of coal under the city of Nottingham and Nottingham University."

Mr. Tapsell said that none of the men employed at these two collieries need be anxious about the future even if this permission was ultimately withheld as there would be jobs with the No. 6 (Bestwood) Area of the East Midlands Divisional Coal Board. The new Cotgrave Colliery would be coming into production in 1963, and would require 2,000 more men by 1967 to obtain planned output. "The West Nottingham miners and their families need have nothing to fear," he said.

"Ludicrous" Request

At a NUM Council meeting at Chesterfield, Mr. Wynn described as "nothing but ludicrous" a request that the Derbyshire NUM should help in a scheme designed to recruit more miners in the area. He said that men were being downgraded and some were being moved 30 miles away to the Nottinghamshire coalfield as pits in Derbyshire were closing down.

Mr. Wynn went on to say that he had written to the NCB saying that to advertise for men in Derbyshire mines was "incongruous." "The Coal Board say that a man working underground earns a minimum wage of £9 17s. 6d. and can earn up to £20," Mr. Wynn said. "But we have had several men who have been de-graded from £20 to £9 17s. 6d. We think it would be incongruous to launch the campaign."

He said a deadlock had been reached in the miners' claim for more wages and a shorter week, and that in another six months a crisis as bad as 1926 could be reached. The Coal Board had told the union, he went on, that if it succeeded in its claim in arbitration, it would mean a very serious cut in production and the closure of pits.

"We cannot tolerate the miners being behind other industries as far as wages and hours are concerned." If that happened, it would not be because the miners had failed in their duty in any way."

A spokesman for the East Midlands Divisional Coal Board commented later that adult labour was not being sought for the Derbyshire coalfield. He said there were, however, vacancies for juveniles and craftsmen.

Coroner's Comments at Pit Death Inquest

ALLEGATION that someone had been "a little less than frank" was made by the Stoke-on-Trent Coroner, Mr. F. G. Hails, at an inquest on Thursday of last week on Mr. Wasyl Antoniw, a chargehand at Stafford Colliery, whose neck was broken when he was travelling to the face in a tub. At one stage the coroner adjourned the inquest while a detective was called in to listen to the evidence.

Saying that "the whole truth hasn't come out," Mr. Hails remarked that witnesses had sworn that a safety notice had been put up only after the fatal accident, but that the colliery manager had sworn the notice had been up for some time. The jury, which returned a verdict of Accidental Death, was earlier told by the coroner: "I certainly think that the police force should ascertain who, if anyone, is lying in this case—because such lying has been on oath."

Mr. Raymond Holmes said he was travelling to the face in a man-riding trolley and that Mr. Antoniw was riding on his own in a tub at the rear of the train. When the trolley went under the engine house, witness had to duck. Just as he was lifting his head again, he heard a shout and saw Mr. Antoniw's feet going over the back of the tub. Mr. Holmes said he had only been told after the accident that the tubs at the front and rear of the train were not supposed to be used for riding in.

Driver of the engine, Mr. Walter Johnson, said that when acting as guard, he had told men not to ride in the tub, but they did so. Notices had appeared after the accident, he said.

The colliery manager, Mr. John Alldred Preston, produced a notice giving rules for haulages at the colliery. He said copies had been displayed at two points for about two years in glass-fronted wooden cases. It was not correct that new notices had been put up after the accident.

EXTENSIVE DEVELOPMENTS are being carried out at the Hartlepool (Co. Durham) works of the Steetly Magnesite Company, Limited. They include a sea-water storage tank, pumping jetty, oil storage tanks, dust plant, switch houses, substation, rotary kiln and coal hopper, a 200-ft.-high chimney and a weigh-bridge and weighhouse. In addition, extensions to the filter house, office block and hydration plant and the construction of a 320-ft.-diameter settling tank, and a pipe bridge are to be carried out.

Personal

Minister's Flying Visit to Poland

CLOSE upon his extensive tour of the coalfields and industrial centres of the north-east coast, the Minister of Power, Mr. Richard Wood, is now visiting Poland at the invitation of M. Jan Mitrega, the Polish Minister of Mining and Electric Power.

MR. RICHARD WOOD

Accompanied by Mrs. Wood, Mr. Hubert Scholes, his private secretary, Mr. T. A. Rogers, H. M. Chief Inspector of Mines, and Sir Josiah Eccles, a deputy chairman of the Electricity Council, Mr. Wood left London Airport for Warsaw on Tuesday. Visits to a coal mine, a generating station, and the Polish Mining Institute and Safety Research Centre are included in the tour. Mr. Wood returns tomorrow (Saturday).

Mr. DONALD BAILEY, managing director of Sir W. H. Bailey & Company, Limited, manufacturing engineers, pump and valve makers, etc., of Patricroft (Lancs), left on Tuesday for a four-day business visit to New York and Havana.

Mr. C. A. M. OAKES, managing director of James Oakes & Company (Riddings), Limited, manufacturers of pipes and fittings, of Jacksdale (Derbyshire), has moved to Skipness Castle, in Scotland. Mr. Oakes will retain his interest in the family business.

To mark his retirement after 41 years' service with the Park Gate Iron & Steel Company, Limited, of Rotherham, Mr. FREDERICK WOODFIELD, assistant managing director, received a presentation from Mr. C. H. T. Williams, managing director of the company.

Among the new officers of the Industrial Association of Wales and Monmouthshire are Dr. A. G. RAMSAY, resident director and general manager of the Mond Nickel Company, Limited, Clydach, Swansea, who was elected senior vice-president, and Mr. DAVID J. YOUNG, secretary of the Steel Company of Wales, Limited, elected junior vice-president for South Wales.

Mr. H. C. BUSTARD, director and general manager of the Mercantile Dry Dock Company, Limited, of Jarrow, has been elected chairman of the North-East Coast Shiprepairers' Association. He succeeds Mr. W. MCMINNIAGLE, assistant managing director of Middle Docks & Engineering Company, Limited, of South Shields. MR. T. A. GREENWELL, joint managing director of T. W. Greenwell & Company, Limited, of Sunderland, has been elected vice-chairman of the asociation in succession to Mr. Bustard.

Council of the Southern Counties Institute of Mining Engineers has unanimously elected Mr. W. V. SHEPPARD as president for the year 1960-61. He is director-general of reconstruction of the National Coal Board and was on the institute's first council when it was formed in 1958. Prof. J. C. MITCHESON and Mr. D. G. HEMMANT were elected as vice-presidents. Prof. Mitcheson, who during the war was the Ministry of Fuel and Power's director of production for the Warwickshire coalfield, is Professor of Mining of the Royal School of Mines, London University.

Mr. WILLIAM HOGG SMITH was the guest of honour at a dinner given by the directors and senior management of companies in the northern group of Allied Ironfounders, Limited, to mark his retirement as chairman of the company. Mr. Smith has completed more than 61 years in the light castings industry. On the formation of Allied Ironfounders group, he was elected to the board of the parent company and since then he has served as a director of all its constituent companies in the Falkirk area. He was appointed deputy managing director of Allied Ironfounders in 1944, vice-chairman in 1954, and has been chairman of the company since 1958.

Among those elected Fellows of the Royal Society at Burlington House, London, last week, was Dr. RONALD HOLROYD, a deputy chairman of Imperial Chemical Industries, Limited. Before joining ICI, Dr. Holroyd was scientific officer of the Safety in Mines Research Board. He became technical manager of the Billingham division of ICI in 1943, research director in 1946, joint managing director in 1951, and a member of the main board in 1952. He has been a deputy chairman since 1957. Others elected Fellows included Mr. A. M. BINNIE, Reader in Engineering, Cambridge University, Department of Engineering; Prof. D. G. CHRISTOPHERSON, Professor of Applied Science, Imperial College of Science and Technology, Department of Mechanical Engineering; Mr. N. L. FALCON, chief geologist, British Petroleum Company, Limited; and Prof. J. H. TAYLOR, Professor of Geology, London University, King's College.

Clyde Shipyard Bought by Norcros, Limited

CAPITAL of the Blythswood Shipbuilding Company, Limited, of Glasgow, has been acquired for £1,1650,000 by Norcros, Limited, the industrial investment holding company. The payment consists of £1,025,000 in cash and £625,000 by the allotment to the vendors, credited as fully paid, of 250,000 ordinary shares of 5s. each in the capital of Norcros, Limited.

Mr. A. G. McBain has resigned from the board and his place has been taken by Mr. Geoffrey Cunliffe, managing director of Norcros. Other members of the board are Mr. W. A. Livesey and Mr. Sydney D. Brown.

Although one of the smaller Clyde shipyards, the Blythswood yard has in the last 10 years been on four occasions the fourth largest gross tonnage producer on the Clyde. Over this period an average of 31,000 tons gross a year have been launched.

Metal Industries Acquires Belfast Scrap Metal Firm

BELFAST firm of scrap iron, steel, and metal merchants, John Lee, is to be acquired by Metal Industries, Limited. The business is being transferred immediately to Cox & Danks, Limited, a wholly-owned MI subsidiary, but will be conducted under the name of John Lee.

The price paid is £45,750, of which £9,100 is to be satisfied by the allotment to the vendors of 2,600 fully paid ordinary MI shares and the balance in cash.

French Steel Prices Rise

OPPOSITION TO WEST GERMAN MERGER

AFTER months of negotiations between the French Finance Ministry and the country's steel federation, French steel prices increase by an average of 4¼ per cent. today (Friday). This increase is lower than had been forecast and is only about half what the federation called for. The High Authority of the European Coal and Steel Community has been campaigning for more than a year because of the disparity between French and other community prices, but the increase will still leave French producers with an advantage over their competitors.

The federation is at the same time planning a group to build a steel plant at Bone, in Algeria. The plant was originally foreseen as an integrated factory with an annual output of 500,000 tons, but the industry is doubtful about the economics of such a project and a less ambitious plan may emerge.

The West German steel and metalworkers' union has urged the ECSC High Authority to reject the application for a merger between the two steel concerns August Thyssen-Hütte, AG, of Duisburg, and Phœnix-Rheinrohr, AG, of Düsseldorf. The union appeal refers to the political and economic dangers of an unusually strong concentration of industrial power.

LD Process for India

An international consortium formed by the Austrian State iron and steel company VOEST and the German concern Gutehoffnungshütte is to make a further extension of the Indian steel plant at Badravati. The Austrian-developed Linz-Donawitz process will be introduced by the Tata steel concern in India by the erection of several LD units. VOEST is to raise the capacity of Rourkela by the building of new LD works.

Rolled steel deliveries by ECSC countries totalled 45,900,000 metric tons last year, 10 per cent. more than in 1958. Of this, about 35,200,000 tons went to member countries, an increase of 9.3 per cent., and 10,700,000 (12 per cent. more) to non-members.

Tonnages exported to outside countries were as follow:—Western Germany (including the Saar for second half of year), 3,500,000 (plus 33.7 per cent.); France (including the Saar for first half of year), 2,700,000 (plus 7.6 per cent.); Belgo-Luxembourg Union, 3,550,000 (plus 0.3 per cent.); Italy, 500,000 (same); and Holland, 100,000 (same). Supplies from the community to the United States rose by 159 per cent., mainly because of the American steel strike.

National Engineering Laboratory

FACILITIES for sponsored investigations for industry will be on show at the National Engineering Laboratory, East Kilbride, Glasgow, on June 15 and 16.

During the open days, the results of work carried out as part of NEL's general programme of basic research, including research into the cold extrusion of steel, the automatic measurement of errors in machine tools, and studies of the performance of high-speed bearings will be displayed, as well as investigations into the growth of fatigue cracks.

United Steel's Sixth "Responsibility" Conference

FOR the sixth successive year, 110 apprentices and junior operatives from all branches of the United Steel Companies, Limited, have volunteered to take part in a weekend residential conference on the theme of "responsibility" to be held at Downing College, Cambridge, from April 8 to 11. It will consist of talks by leading industrial and educational authorities interspersed by discussion groups.

Chairman of this year's conference is Mr. Kenneth Davis, a director of Radiation, Limited—who also took the chair in 1956 and 1959—and the principal speakers will be Mr. L. B. Birch, deputy director of Sheffield University's Institute of Education, Mr. H. P. Forder, a director of United Steel and general manager of Samuel Fox & Company, Limited, and Mr. A. G. Dickson, secretary of the Commonwealth Studies Committee of the Royal Commonwealth Society.

Questions on the responsible use of leisure will be prepared for submission to an open forum panel, whose members will be Mr. Davis, Mr. J. O. Blair-Cunynghame, a director of the Royal Bank of Scotland and until recently staff member of the National Coal Board, the Ven. M. T. Dunlop, Archdeacon of Aston, Birmingham, and Mr. T. S. Kilpatrick, a director and general manager of Workington Iron & Steel Company.

Output of UK Farm Machinery Rises

AS production of farm machinery increases rapidly, all the major manufacturers have announced plans to raise capacity. Last year there was a 20 per cent. rise in tractor exports and this year output is expected to be about 15-20 per cent. higher than in 1959. Manufacturers expect that the annual level of home sales, which has been running at about £50,000,000, will at least be maintained this year, although the market will be increasingly competitive. Exports, which account for more than half the industry's outout, may exceed last year's record of £105,000,000.

There is, however, anxiety about the level of imports, which now account for 10-12 per cent. of the home market. Some continental manufacturers, particularly the Germans, are planning further encroachments this year.

Non-ferrous Metals

Uneasiness for Future Supplies of Copper

THE copper market in London has been behaving as if it had a life of its own, free from all complications of what is happening to the copper industry in the United States. Indeed the price structure in London has a very firm appearance and, although the undertone is sensitive, the immediate outlook is, on balance, for higher rather than lower prices. Stocks of refined metal in LME warehouses—at the end of last week they stood at 2,049 tons—are extremely low; racial disturbances in South Africa have caused a good deal of uneasiness about future supplies, and consumer demand from both the UK and from the Continent is good. Moreover, it is generally felt that the outlook must take into consideration the scope for a large natural unsatisfied demand for the metal as well as for building up stocks.

Against this background the prices of both cash and three months' metal have gone ahead and although the market is sensitive the outlook is for a continuation of the present trend. This is saying quite a lot when looking at the US copper markets. There, demand remains slow and the possibilities of a reduction in the prices of both custom smelter and producers' copper from its present level of 33 cents a pound cannot be ruled out. Nevertheless, London is floating on a shortage of physical copper and until supplies are more adequate no real break in the price structure is looked for.

Interesting news from the US is that at long last a settlement has now been achieved at the Laurel Hill Refinery and that Kennecott Copper Company may invest about $200,000,000 on installations at the El Teniente mining camp of the Braden Copper Company, a Kennecott subsidiary. There is also the possibility of Kennecott investing a further $300,000,000 on modernizing this mineral camp in Chile.

Tin has turned dull in the East and in London, and continues so in New York where the price has fallen below $1 a pound. The focal point of interest in this market is the draft of the new International Tin Agreement which will be discussed in May by the United Nations sitting in New York.

Lead is an active market in London. However, slight apprehension about arrivals of foreign metal has made for somewhat patchy conditions and the price is moving nervously. The market remains quiet in the US with the price unchanged at 12 cents a pound.

Zinc continues to be a good market in London and fair in the US. Overall demand is satisfactory and the outlook is for a continuation of the present trend. In the United States the market is experiencing sporadic trading conditions with the price holding at 13 cents a pound.

Official metal prices in London yesterday (Thursday) were:—COPPER, Standard: Prompt £254, forward £240 10s. TIN, Standard: Prompt £789, forward £788. LEAD: Prompt £76 10s., forward £75 17s. 6d. ZINC: Prompt £93 5s., forward £91.

DISCUSSIONS BETWEEN Mountstuart Dry Docks, Limited, of Cardiff, and Prince of Wales Dry Dock Company, Swansea, Limited, have been discontinued. According to a joint announcement, the companies have failed to arrive at mutually acceptable terms.

Aluminium Sales Reach a New Record

DEMAND for aluminium showed substantial growth in 1959 and free world consumption rose to record levels, said Mr. Nathanael V. Davis, president of the Canadian company, Aluminium, Limited, in a message to shareholders in the company's annual report. He said that the 1959 figures were about 20 per cent. higher than the previous record in 1956 and that in the middle of the year a turning point was reached in the return to improved aluminium markets.

The company's Canadian aluminium smelters were currently operating at about 90 per cent. of the rated capacity. Sales and operating revenues last year were $448,700,000 compared with $422,900,000 in 1958. Consolidated sales of aluminium in all forms in 1959 were 643,328 (581,195) tons. In the fourth quarter, sales reached a record 200,000 tons which, Mr. Davis said, was believed to reflect some inventory buying in anticipation of a price rise.

Consolidated net profit was $24,000,000, or 79 cents a share, which Mr. Davis described as a "modest improvement" over the $22,464,510, or 74 cents a share, in 1958. During 1959, the company spent $62,000,000 on new plant and facilities, a decrease from $103,000,000 in 1958.

"Competition a Spur" to Metallic Spring Research

COMPETITION of new materials would be a spur to research on metallic springs said Sir Harry Melville, secretary of the Department of Scientific and Industrial Research, after opening the new laboratories of the Coil Spring Federation Research Organization in Sheffield on Thursday of last week. Saying that spring makers were now faced with rubber as a spring material for special purposes, as in motor cars, Sir Harry suggested that this was just the kind of competition to urge the research organization to do its utmost to demonstrate the virtues of the metallic spring.

He went on: "With all your new equipment, I should imagine it will be possible to design springs to closer tolerances and with longer working lives and decreased costs, so that they can remain fully competitive with, say, rubber or pneumatic suspension systems." He hoped that, as the result of the findings of the laboratories, spring makers would press hard to secure the highest qualities of raw materials, and that steelmakers would ensure that spring makers got the right materials at the right time.

Sir Harry said he had heard that the organization was considering the possibility of applying for incorporation and thereby becoming a fully-fledged research association constituted on a permanent basis. Such a step would be welcomed by the DSIR.

CENTRIFUGAL PUMP which has only 254 parts instead of the usual 1,250 has been perfected by Pegson, Limited, makers of coal preparation plant, industrial screening equipment, etc., of Coalville (Leics). The company is now producing 42 different sizes of the pump and has secured a number of orders for the pumps from oversea, where they are particularly useful for irrigation purposes.

Law Cases

RETIRED DIRECTOR'S CLAIM

Entitlement Under Pension Agreement

AT Birmingham Assizes Mr. Commissioner Mocatta has found in favour of Mr. C. E. Partridge, a retired company director, who is claiming £64,000 from his former employer, Rubery Owen & Company, Limited, structural and manufacturing engineers, of Wednesbury (Staffs). Mr. Partridge claims he is entitled to the money under a pension agreement. The Commissioner announced that he would adjourn the question of a remedy for Mr. Partridge until he had heard submissions from Counsel at a later date.

The court had to consider, Mr. Commissioner Mocatta said, by reference to agreed conduct by the parties whether an agreement was to be implied by that conduct. In this case there was no oral or written agreement—there was merely the conduct on which Rubery Owen relied in its defence.

Earlier in the hearing Mr. James Gibson, for Mr. Partridge, said that because of his surtax position, the company had agreed that Mr. Partridge should not receive more than £6,000 a year in bonuses, any excess to be waived in consideration of the pension payable after retirement.

£127,000 in Bonus Money

Between the time of this agreement, in 1949, and 1956 Mr. Partridge had earned £127,000 in bonus money. He had drawn £53,000 of this and the company had kept the rest. Later the company decided to effect a pensions annuity with the object of providing an additional allowance for Mr. Partridge at 65. The amount of this pension was £942 a year.

The company had paid £10,000 in premiums on this partial pension, leaving £64,000 still owed to Mr. Partridge, Mr. Gibson submitted.

Mr. Commissioner Mocatta said it was inconceivable that Mr. Partridge's conduct in accepting the partial pension could be construed as an acceptance of his policy in full and final settlement.

"Looking at the agreement conduct the only conclusion I can come to is that the partial pension settlement was on account of or in part settlement of the rights and liabilities of the parties," he added.

Two Mine Officials Fined

EXPLOSION at St. John's Colliery, Normanton (Yorks), in which three men received fatal injuries, led to the fining at Wakefield West Riding Court of two pit officials for offences under the Mines and Quarries Act. Baden Hector Hatherton (59), colliery manager, and Anthony Sewell Harris (33), an undermanager, were each fined £25 after admitting failure to ensure adequate ventilation for diluting gas at the pit on September 26. They were also ordered to pay £10 10s. each advocate's fee and witnesses' expenses of £6 10s. each.

Prosecuting for HM Inspector of Mines, Mr. L. Pratt said the explosion occurred in the 11-yard Seam at the right hand face of No. 1 district. Three men were working to join up the heading at the face with a return gate by breaking through the coal. When they got there they would have had a continuous flow of air, but it was submitted that steps had not been taken to ensure the removal of a high concentration of gas which had developed through a sudden rise in the seam.

It would have been a simple matter to have put up a wall from the last ventilation slit along to where the men were working to provide a continuous current of air, and this would have been normal mining practice. Mr. Pratt said there had been no experience for two years of any unusual concentration of gas in that area and this had possibly led to a sense of false security.

For Hatherton, Mr. C. D. Chapman said that he had no reason to know that the coal seam went up. A deputy had tested for gas an hour before the accident and found it safe to fire a shot. Mr. H. C. Muscroft said that Harris had committed a technical offence. He was working at that time longer hours than any employer had a right to expect. He was working six faces, five of which were giving trouble through faults. The week before he worked two 14-hour days and his normal working day was 11 hours.

Mr. H. Currer Briggs, presiding, said it was not the two men's sole responsibility that this unfortunate accident occurred. By reason of their greater experience and training there was some duty upon them to do the thinking for those under them, if at any time they felt there were conditions which might lead to gas accumulation.

MACHINEMAN LOSES CLAIM

MACHINEMAN who was injured in a fall of coal failed at Dunfermline Sheriff's Court in his claim against the National Coal Board for £350 damages. The plaintiff, Mr. Alexander Elder Armour (49), said he was buried up to the neck in the fall and that his right arm was broken.

Dismissing the claim, Sheriff R. R. Kydd said he had found nothing to support Mr. Armour's claim.

£2,522 FOR LOST EYE

WHILE testing a milling machine, a worker was struck in the left eye by a piece of a broken cutter, it was stated at Birmingham Assizes. The man, Mr. James Harold Colclough, was awarded £2,522 damages, including special damages of £222, against his employers Dowding & Mills, Limited, industrial electrical repair specialists, of Birmingham.

Mr. Justice Austin Jones said that the machine had

an efficient guard, but that the test could not be carried out if the guard were completely or nearly closed. The firm claimed that the accident could not have been foreseen and that the machine was rotating so slowly that it could not be expected that pieces of a broken cutter would fly out.

The company should have foreseen the possibility of such an accident and should have provided the operator with eye protection. It was not suggested that Mr. Colclough was negligent.

PIT SECURITY MAN ATTACKED

MAN who was wheeling a push-chair containing coal along railway sidings attacked a pit security officer who tried to stop him, it was stated at Newcastle (Staffs) Magistrates Court. The accused, Arthur William Westerholme (35), was fined £5 on each of two charges of stealing 18s. worth of coal from Parkhouse Colliery, and assault causing actual bodily harm. Westerholme admitted both offences.

The defendant was alleged to have told the security officer, Mr. Noah Johnson: "I am going to take it home because I have a sick child." He then struck the officer several blows in the face and stomach and threw him to the ground.

Later, Westerholme was alleged to have told the police: "I am sorry for hitting that man. I don't like hitting people older than myself. He has a job to do." In court, Westerholme told the magistrates: "I was a bit upset at the time and flew off the deep end."

MINER WHOSE LEG was broken by a fall of stone at the Prince of Wales Colliery, Pontefract, was at Leeds Assizes awarded damages of £500 with costs against the National Coal Board. He was Mr. William Lawley, of Castleford.

SCRAPMAN WHO injured his left hand when he slipped on some scrap at the Ebbw Vale works of Richard Thomas & Baldwins, Limited, was at Blackwood County Court awarded £200 damages against the company for personal injury. The plaintiff was Mr. James Glyndwr Williams.

DAMAGES of £9,050 and costs were awarded at Leeds Assizes to Mr. Ernest William Clarke (42), a miner, for injuries received when he fell over an underground tension box at Monk Bretton Colliery (Yorks). Giving judgment against the defendants, the National Coal Board, Mr. Justice Salmon ruled that the box was a dangerous obstruction.

AGREED DAMAGES of £5,000 were awarded in Ulster High Court against Harland & Wolff, Limited, Belfast shipbuilders, in an action for negligence brought by Mrs. Ruby Glover and her three children. The husband of the plaintiff, Mr. John Glover (31), a plater's helper, died 10 days after being struck by steel plates which fell from a sling while he was working in the hold of a tanker which was under construction.

MANCHESTER company of machine-tool makers, Edward G. Herbert, Limited, has been appointed sole agent in Great Britain and Eire for the complete range of Elettrorava balancing machines and equipment made by Ing. A. Rava, Torino, Italy. This new agency is complementary to the existing connection between Edward G. Herbert and the Tinius Olsen Testing Machine Company, of the USA, which has become sole agent for Rava balancing equipment in the States.

Ruhr Coal Marketing Scheme

AFTER the announcement that the common marketing system of the Ruhr coal producers would continue until the end of June, the High Authority of the European Coal and Steel Community has now refused extension beyond April 30. The original expiry date was yesterday (Thursday). The Authority may, however, alter its decision.

The German State-owned Bergwerksgesellschaft Hibernia, AG, of Herne, will close its central coking plant at Scholven on June 1 and its Wilhelmine-Victoria coal mine on July 1. The company, which last year produced about 10,300,000 metric tons of coal, plans to reduce 1960 output by 800,000 tons.

The Lothringian coal-mines in France are to reduce the price of all qualities of household coal by NF 10 a ton. The mining concerns of the Nord and Pas de Calais have agreed on reductions for certain household grades of an average of NF 9 a ton. The reductions are part of a premature summer price reduction.

Cologne-based coal-mining concern, Ilse Bergbau, AG, is to raise its DM 3,700,000 (over £300,000) share capital by 50 per cent. by the issue of new shares.

Dutch coal mines have received a further $6,000 for coal stocks compensation.

Roof Fall Kills Miner After Shotfiring

MORE than two hours after shots had been fired to blow out rubble in Wyrley (No. 3) Colliery (Staffs), part of the roof collapsed and trapped a miner, it was stated at a Cheslyn Hay inquest last week. A verdict of Accidental Death was returned on Mr. Joseph Edward Jackson (39), who was dead when released nearly six hours after the accident.

A deputy, Mr. Thomas Albert Williams, said he examined the roof and found it in poor condition although he considered it was adequately supported. After the shots were fired, an arch girder was put in to give the roof more support. When later he left the area, the deputy was satisfied that the three men working in that section were safe. He thought the cause of the accident was disturbance due to the cutting of the face, which caused a girder to fall out. The fall was not extensive.

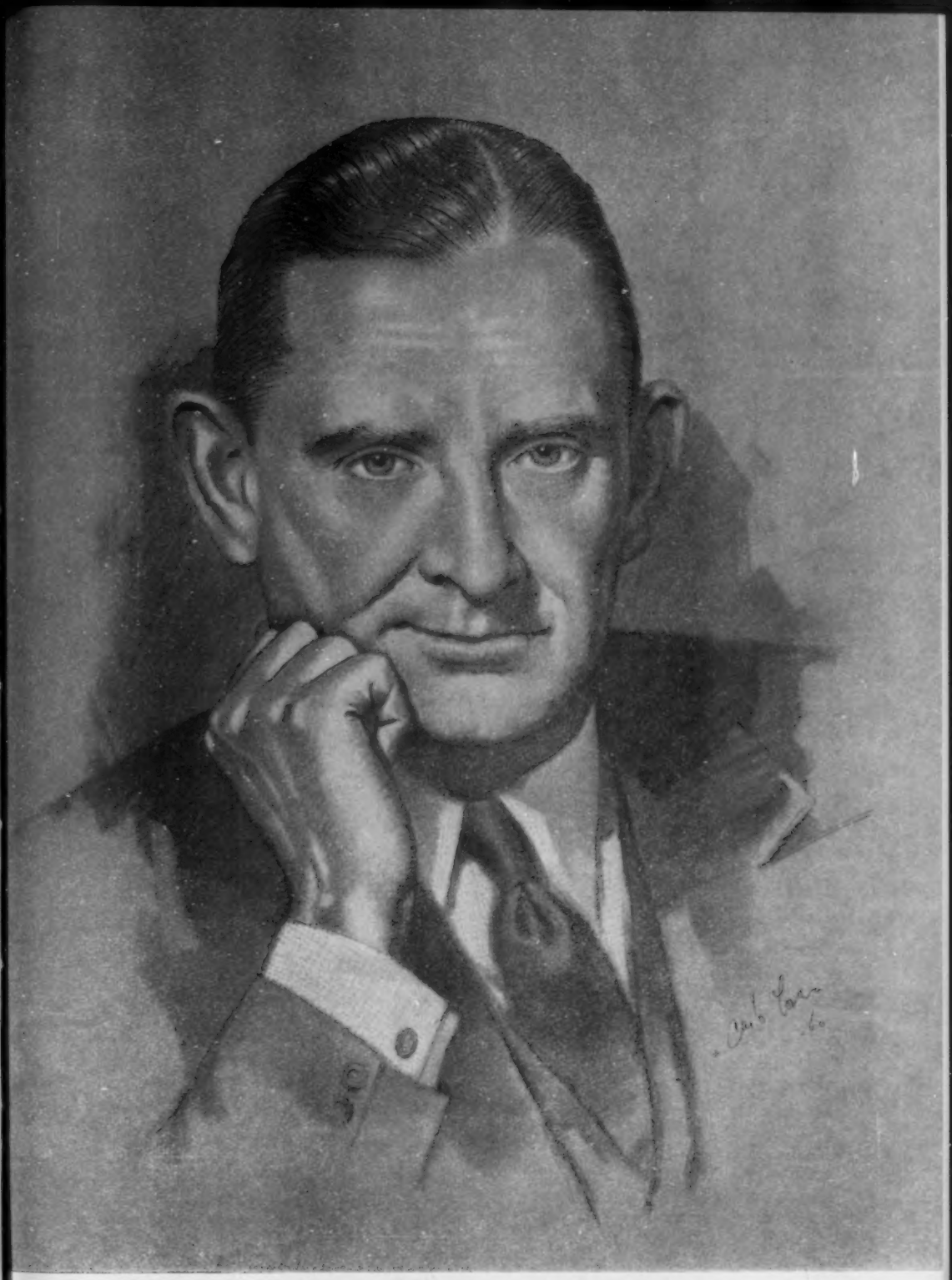
The two miners who were working with Mr. Jackson said they were satisfied the spot at which they were working had been made as safe as humanly possible.

Australian Coal Merger

TWO leading Australian Colliery companies have merged to form Coal & Allied Industries, Limited. It will have a nominal capital of £A10,000,000 of which about half will be paid up.

The companies, both operating in New South Wales, are J. & A. Brown & Abermain Seaham Collieries, Limited, and Caledonian Collieries, Limited.

THE WEST GERMAN metal dealers and plastic producers, Metallgesellschaft, AG, is paying 15 per cent. for the year ended September 30, 1959. Net profit was DM 21,832,000.



SIR RONALD L. PRAIN, O.B.E.

SIR RONALD L. PRAIN, O.B.E.

SIR RONALD LINDSAY PRAIN, who takes office this month as president of the Institute of Metals for 1960-61, was born at Iquiqui, Chile, in 1907, and educated at Cheltenham College. In 1926 he joined the Anglo Metal Company, Limited, of which he was made a director in 1936 and chairman in 1946. In 1939 he joined the board of Rhodesian Selection Trust, Limited, and four years later became managing director of Roan Antelope Copper Mines, Limited, and Mufulira Copper Mines, Limited, becoming chairman of these three companies in 1950. During this period he also joined the boards of Selection Trust, Limited, San Francisco Mines of Mexico, Limited, the Metal Market & Exchange Company, Limited, and others.

In 1953, when Roan Antelope Copper Mines, Limited, Mufulira Copper Mines, Limited, Rhodesian Selection Trust, Limited, and other associated companies moved their head offices to Rhodesia, Sir Ronald continued as chairman, and is now chairman and president of these and other companies in what is now known as the Rhodesian Selection Trust Group of Companies. Last year, he was made chairman of the newly formed Bamangwato Concessions, Limited, and he was appointed by the Rhodesian Federal Government to be chairman of the new Agricultural Research Council of Rhodesia and Nyasaland. He has recently joined the board of the Monks Investment Trust, Limited.

Sir Ronald was Controller of Diamond Die and Tool Control, Ministry of Supply, from 1940-45, and of the Ministry's Quartz Crystal Control from 1943-45. He has been a director of the International Nickel Company of Canada, Limited, since 1951, and is a member of the advisory committee of that company and of the Mond Nickel Company, Limited. He is also a director of Barclays Bank D.C.O. (Rhodesian local board) and of Wankie Colliery Company, Limited. In 1956, he became chairman of the newly formed Merchant Bank of Central Africa, Limited.

Sir Ronald has been chairman of the management committee of the Copper Development Association since 1949 and chairman of council of the association since 1951. He is also a member of council of the British Bureau of Non-Ferrous Metal Statistics, vice-president of the British Non-Ferrous Metals Research Association, and a past-president of the British Overseas Mining Association. He is vice-president of the Royal African Society and a member of council of the Institute of Race Relations. He is an honorary member of the Institution of Mining and Metallurgy and a member of council of Cheltenham College. Sir Ronald was awarded the OBE in 1946 and was knighted in 1956.

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Fully Automatic

BULK HANDLING LUBRICATION SYSTEM FOR A SINTER PLANT

*By GWYN WILLIAMS**

The first stage of a scheme for the fully automatic bulk handling of grease-type lubricant was introduced at the sinter plant at the Margam Works of the Steel Company of Wales, Limited, in the spring of 1959. The scheme is designed to eliminate the use of barrels and other manually handled containers. Advantages found during the first 12 months of operation include:—Cheaper lubricant through bulk delivery, considerable savings in direct and indirect labour, and a great improvement in housekeeping and general safety.

THE ore-preparation plant at Margam consists of an ore crushing and screening plant with two parallel 500 ton/hr. lines, a coke crushing and screening plant, and the three-strand sinter plant. The plant was built by Lurgi-Chemie and was first commissioned in 1954. No. 1 strand came into operation in June, 1954, No. 2 strand in November, 1954, and No. 3 strand in May, 1959. Further details are given in the appendix.

Lubrication Problems

In a plant of this type and magnitude, many lubrication problems inevitably arise, and one problem stood out above all others—the need to maintain at all times an airtight seal between the slide track and the pallets carrying the sinter bed. Unless the integrity of this seal is maintained, air may leak through the slide joint instead of passing through the sinter bed, with a consequent waste of power and loss of quality and output of sinter.

This dilemma is best understood by reference to Figs. 1 and 2. Each of the three sinter machines incorporates 92 pallets, each 8 ft. 3 in. wide by 3 ft. 3 in. long. The four outer rollers of each pallet run on rails mounted on vulcanized rubber, provision being made for height adjustment. These rails relieve the slide track of most of the weight. The underside strips of the pallets therefore slide smoothly over the replaceable steel strips forming the slide track. The resultant joint is made airtight by a cushion of lubricant discharged from the four direct-feeding automatic multi-greasers provided on each machine to a total of 80 lubrication points spread out along the pair of slide rails.

As the 2,650-h.p. fans have a rated flow of 245,000 cub. ft./min. at 40 in. w.g. suction, the need for an efficient grease seal will be apparent.

Selection of Lubricant

The lubricant initially used to make this seal was a lithium-based grease of No. 2 consistency and a drop point of 380 deg. F. Because of the excessive quantities used, this grease proved very expensive, and, in addition, did not provide a good seal under

* Lubrication engineer, blast furnaces, sinter and ore preparation plant, Steel Company of Wales, Limited, Margam.

FIG. 1.—SINTER STRAND AT MARGAM SHOWING TWO OF THE FOUR CENTRALUBE MODEL FOB LUBRICATORS SUPPLYING THE STICKY-STIFF GREASE FOR THE AIRTIGHT SEAL BETWEEN THE SLIDE TRACK AND PALLET. THESE PUMPS ARE FULLY SELF-CHARGING FROM THE CENTRALIZED STORAGE TANKS (SEE FIG. 3).

FIG. 2.—NO. 1 AND 2 SINTER STRANDS WHICH ARE SUPPLIED WITH LUBRICANT FOR SEALING BY THE ORIGINAL CENTRALUBE MODEL FWA LUBRICATORS UNTIL SUCH TIME AS THE FULLY SELF-CHARGING MODEL FOB LUBRICATORS CAN BE FITTED. THE NEW SCHEME, HOWEVER, ENSURES THAT EVEN THESE EARLIER LUBRICATORS CAN BE RECHARGED SEMI-AUTOMATICALLY (*i.e.*, WITHOUT MANUAL HANDLING) FROM THE CENTRALIZED STORAGE TANKS.

the conditions and temperatures encountered during sintering.

A sodium-based grease of stiffer (No. 3) consistency and a drop point of 315 deg. F. was accordingly substituted. Further tests were carried out with another sodium-based grease having a fibrous texture. The results of extensive trials with both grades showed no better results than the lithium-based grease, although lubricant costs were considerably reduced.

Failure to obtain the desired adhesive lubricant film on the wearing strips of the slide rails led to inquiries being made from other Lurgi sinter plants, particularly those in Germany. Their experience suggested that a compound based on a heavy residual oil of an asphaltic type should provide a suitable seal-forming lubricant. In sintering, the most important factor is the adhesive strength of the lubricant after leaving the lubrication outlets of the strand slide rails, and the suggested compounds appeared to have this characteristic in full measure. After consultation with the lubricant suppliers, a high-viscosity adhesive compound (Shell Cardium Compound C in summer, and Compound A in winter) was introduced.

Immediate success was achieved with this new compound; indeed, during the assessment trials carried out by BISRA in 1956, no indication was found of air passing through the pallet grease seals, although leakage was detected around the flanges and seals of the windlegs. In addition to providing a satisfactory seal, the new lubricant was 31 per cent. cheaper than the sodium-based grease previously used.

The main problem had now been solved, but handling the lubricant presented many new difficulties, not least since each strand was consuming approximately 8,000 lb. of the sticky-stiff compound each month. A steam-heated sub-oil store had to be built at the level of the strand floor. The compound, which was supplied in barrels, was man-handled via the lift in the sinter building to the strand floor and thence to the sub-stores. After reaching the required temperature, the lubricant was transferred manually to the lubricating pumps.

Due to the tackiness of the compound, up to 10 per cent. of the contents was frequently left in the barrel even after heating. Furthermore, the continuous two-way movement of full and empty barrels made the whole operation most tedious and interfered seriously with good housekeeping in the plant.

Eventually, the installation of No. 3 strand brought matters to a head, and the need for centralized bulk handling of this sticky-stiff material became urgent. Unfortunately, the very characteristics which make the lubricant an excellent sealing medium also render it a most difficult material to pump. The possibility of installing a centralized system was nevertheless broached with the pump suppliers (Centralube, Limited).

At this time (1957)* no experience of an automatic bulk system was available, even using normal lubricants.

After some research, it was agreed that a *line system* (operating on a pressure basis) was entirely impracticable, while a *direct feeding system* (operating on a positive volume basis) would be able to pump the lubricant under the prevailing conditions, but could not cover the distances involved at Margam. The solution was eventually found in a combined system, in which *positive volume* (direct feeding) pumps are interposed in a *positive pressure system*. Master feeding pumps convey the compound by means of a *positive pressure system* from

* Since this article was prepared it has become known that a bulk handling system for grease had been introduced in the United States by the Inland Steel Corporation. This scheme is reported to utilize 2-ton tanks, which are taken out of the mill building and filled with a thin grease. The tanks are then taken back and the grease is transferred by air barrel pumps via a pipe line to the containers of the lubricating pumps. From the report it would appear that the Inland Steel scheme is not either automatic or positive enough for heavy substances. Therefore, while being a creditable and interesting solution of the corporation's own problem, which appears to be the recharging of containers of lubricating pumps, the Inland Steel scheme—even if it had been in existence at the time—would have provided no help in the basically different development of the fully automatic and positive lubrication system envisaged for Margam.

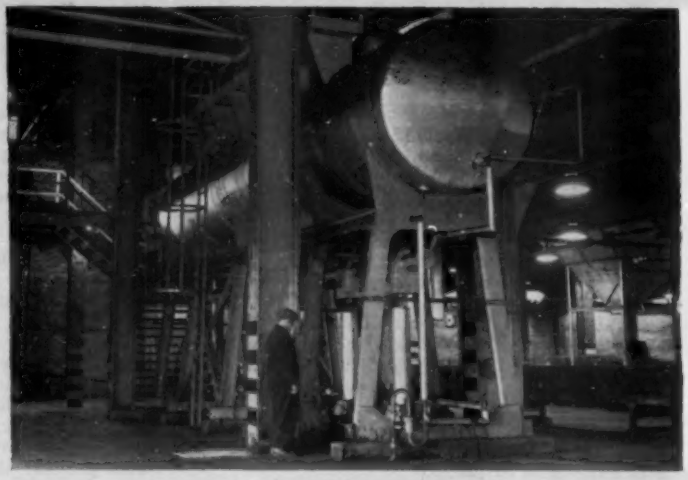


FIG. 3.—THESE BULK INSTALLATION STORAGE TANKS (POSITIONED ON THE GROUND FLOOR BETWEEN AND BELOW NO. 2 AND NO. 3 STRANDS) HOLD 12½ TONS AND 13½ TONS, RESPECTIVELY. THE TANKS ARE STEAM HEATED AND ARE CHARGED DIRECTLY THROUGH LAGGED MAINS WITH HEATED LUBRICANT FROM ROAD TANKERS.

the storage tanks to the lubricating pumps, which then distribute on a *positive volume* basis.

Initially, a scheme was developed which would not only effect completely automatic lubrication of the seals of No. 3 strand (Fig. 1), when this was installed, but could also be extended to recharge semi-automatically (*i.e.*, without manual handling) the lubricators serving Nos. 1 and 2 strands (Fig. 2), until such time as these lubricators (Centralube Models FWA) could be replaced by those of the fully self-charging type (Centralube Model FOB) used on No. 3 strand.

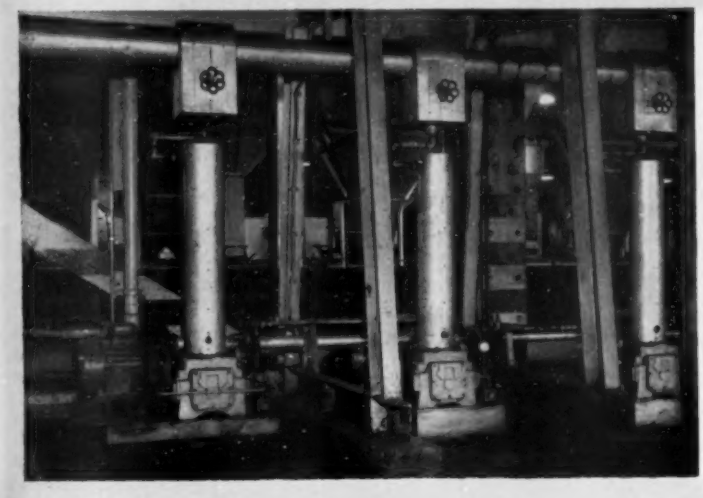
Automatic Centralized Bulk Handling System

Figs. 3 and 4 show the general scheme as now employed. Two storage tanks are located on the ground floor between and below Nos. 2 and 3 strands in a position well suited to cater for the needs of future strands. These tanks hold 12½ tons and 13½ tons (14 and 15 short tons) of lubricant and are mounted on six 8-ft. 5-in. trestles, a ladder and overhead walkway providing for easy inspection. The tanks are heated by 4-in. dia. steam coils.

Delivery of lubricant is made in minimum loads of 10 tons by lagged road tankers from a grease works in the north of England. The tankers are specially built so that the temperature of the contents falls by only about 1 deg. C. per day. The tanker discharges via a 3-in. dia. supply main, which runs from the roadway under the sinter building to the top of each tank.

From the storage tanks, lubricant is fed through a 4-in. dia. lagged main (incorporating a strainer) into the three master feeding pumps (Centralube Model HA.III) shown in Fig. 4. This arrangement permits direct feeding of the master pumps.

A fourth master feeding unit will shortly be added as a stand-by in case of breakdown of one of the other three master pumps. To allow for such an eventuality, all supply lines leading from these pumps are interconnected by a series of shut-off valves.



Each of the master feeding pumps has a rated capacity of 180 lb./hr. at a maximum working pressure of 4,500 lb./sq. in. Practical experience, however, shows that, at the operating pressure actually employed, the output of the master feeding pump serving Nos. 1 and 2 strands is 220 lb./hr.

A most important feature of these pumps, operating on a

FIG. 4.—FROM THE STORAGE TANKS OF FIG. 3 LUBRICANT IS FED DIRECTLY THROUGH A 4-IN. DIAMETER LAGGED MAIN TO THE THREE MASTER FEEDING PUMPS SHOWN HERE. THESE PUMPS OPERATE ON A POSITIVE PRESSURE BASIS TO SUPPLY THE VERY HEAVY GREASE TO THE LUBRICATING PUMPS NEAR THE SINTER STRANDS.

positive pressure basis, is the provision of an integral return valve to give precise control of pressure in the output line. This valve permits each master feeding unit to operate at the lowest pressure consistent with the requirements of the lubrication system served.

From the master feeding pumps, three supply lines of 20-mm. steel pipe carry the lubricant from the ground floor to the strand level of each sinter machine. This involves a lift of 33 ft. above ground floor for Nos. 1 and 2 strands and 46 ft. for No. 3 strand. The longest run of supply pipe is 315 ft. Each main is traced with an electric heater tape, which runs axially along the pipes and is not lagged. A separate step-down transformer (440:110 v.) with manually operated switch is provided for each heating circuit. This independent control is necessary because the heating tapes are used only in cold weather when a particular strand (or strands) has been out of commission for a period. In such circumstances the heater tape obviates any danger of the lubricating compound being so viscous that it is impossible to pump.

For reasons already stated, the lubricating pumps for Nos. 1 and 2 strands are semi-automatically recharged, whereas the pump on No. 3 strand is fully self-charging. Both models of pump are of the positive volume and direct feeding type. They incorporate no springs or valves, and appear to be the only pumps available which are capable of handling this very difficult lubricant.

The lubricating pumps are constantly charged by the new master feeding system from the centralized supply, each pump being isolated as required by means of a shut-off valve. All lubricators are interlocked electrically with the sinter machines to give fully automatic operation.

Operating Experience

The improvements expected from this fully automatic bulk handling lubrication system have been more than confirmed by experience of operation over the first 10 months. The system has demonstrated the following six main advantages to the company, quite apart from those experienced by operating personnel:—

Saving in direct labour—The direct labour force on No. 3 strand is two less than it would otherwise have been.

Saving in indirect labour—Precise figures are difficult to ascertain, but savings must be considerable, as 12 tons of grease is handled each month by the bulk lubrication system, which eliminates the need for manual transportation and storage of barrels.

Better housekeeping—The elimination of barrels containing a sticky compound and of the transfer of this compound into the pumps has greatly assisted good housekeeping in the sinter plant.

Improved safety—The handling and lifting of barrels and the transfer of lubricant from the barrels previously presented risks which have been eliminated completely by the new system.

Saving in cost of lubricant—The grease being delivered in bulk, the suppliers have been able to reduce the price per ton to 34 per cent. of that for the original lithium-based grease and to 69 per cent. of the cost of the subsequent sodium-based grease.

Improvement in labour relations—The handling of sticky cardium compounds was greatly disliked by the men, for obvious reasons. Elimination of this handling under the new system has contributed to a better labour relationship between management and lubrication personnel.

Recommendations

Consequent upon the success of this bulk handling system, it is possible to make a number of recommendations for extending the benefits obtained.

Clearly, any future sinter strand should be equipped in the same manner, and, as mentioned already, provision has been made in the present system to facilitate future extensions.

Another bulk lubrication system should be considered to provide automatic feeding of other multi-greasers throughout the whole sinter building. For this purpose, the lubricant should be standardized on a lithium-based grease of No. 2 consistency, to be delivered by road in bulk supply hoppers. These hoppers should be placed above a central pumping station, identical to the present one, which would feed a similar system to distribute the grease throughout the building. As a refinement, pressurized grease lines could be laid, and fitted with special take-off adaptors where necessary to permit "tapping" of the lines by grease guns on flexible pipes for the lubrication of sections of plant having numerous "nipple" applications.

Looking further afield, bulk lubrication systems, based on similar principles, could well be applied to rolling mills and other major items of plant which depend on centralized lubrication systems. By such means, the use of barrels can be entirely eliminated over large sections of industry.

Acknowledgment

The author is indebted to the officials of the Steel Company of Wales, Limited, for permission to publish this article, to Mr. K. C. Sharp and Mr. D. A. Jenkins for the help and encouragement given to him throughout the period of preparation, installation, and operation of the scheme, and to Centralube, Limited, and Shell-Mex & B.P., Limited, for the technical assistance they have provided in their respective spheres of activity.

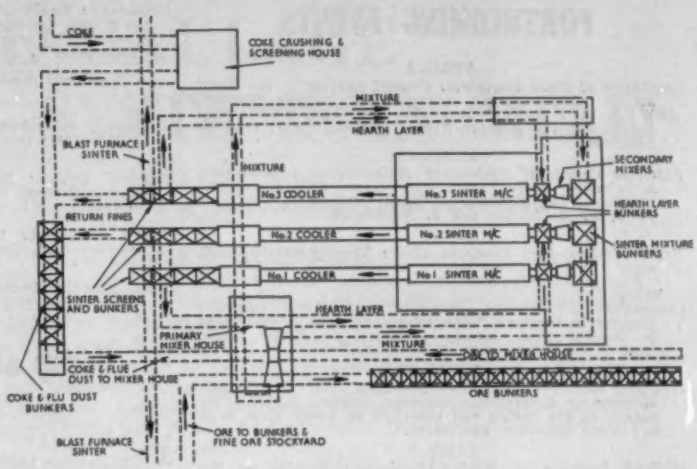
APPENDIX

Description of Ore-preparation Plant at Margam

The ore-preparation plant at Margam consists of an ore crushing and screening plant, a coke crushing and screening plant, and the sinter plant (see Fig. 5).

Ore crushing and screening plant—This plant has two parallel 500 tons/hr. lines, each of which consists of two primary and two secondary ore

FIG. 5. — FLOW DIAGRAM OF MARGAM SINTER PLANT.



crushers, with two primary and two secondary screens. Oversize ore from the screens is fed by a conveyor system to the five blast furnaces. The undersize ore is conveyed to the sinter plant. A by-pass line of approximately 1,000 tons/hr. of fines is fed directly to the fines bunkers or ore fines stockyard.

Ore crushing and screening plant— All undersize coke (−1¼ in.) from the blast furnaces and coke ovens is fed to the receiving bunkers of this plant by conveyor system, road, or rail. The coke is screened and crushed to give the nominal maximum size required.

Sinter plant—The main sinter building has three sinter machines, each covering an area of 968 sq. ft. To feed these machines there is a mixture gathering system for flue dust, limestone, coke, and return fines. The ore-gathering conveyor belt leads to the primary mixers from the ore fines bunkers, into which is also fed the admixture from the opposite side.

The mix is conveyed to the top of the sinter building, where it is fed to the sinter machines, via hoppers, screens (to remove oversize material), roll feeders, secondary mixers, and a swinging conveyor belt for even distribution on the machine.

Material for the hearth layer is elevated on a separate conveyor system to surge hoppers, and is fed on to the pallet grate bars prior to the admixture, to a depth varying from 1½ in. to 4 in. The maximum bed height, including the hearth layer, is 12½ in.

The ignition hoods are of the semi-circular type, 4 ft. 3 in. long by 8 ft. 3 in. wide. They are supplied with blast-furnace gas, enriched with coke-oven gas.

The pallets of the sinter machines are each fitted with approximately 400 grate bars. Sinter is produced over 19 windboxes connected to a common waste-gas main.

The fans, of the backward bladed type, are driven by 2,650-h.p. electric motors through fluid couplings.

The fans have a rated capacity of 245,000 cub. ft./min., at 40 in. w.g. suction and 150 deg. C. The three fan outlets enter a chimney common to the three machines.

Sinter discharged from the pallets is broken by a pronged roll breaker on to the 212-ft. long, 4½-ft. wide trayed cooling conveyor. Three extraction fans are installed at intervals along a hood, which covers each cooling conveyor. Cooled sinter is discharged on to horizontal vibrating screens which give four fractions: +⅜ in. to −⅛ in. and +1 in. for blast-furnace sinter, +⅜ in. to − 1in. for the hearth layer, and −⅛ in., which forms the return fines.

Each strand has a production capacity of approximately 12,000 tons of sinter per week.

BULGARIAN METAL PLANT IN CHINA

IT was reported, with some surprise, in the June 13, 1958, issue of IRON AND COAL, that the Bulgarian governmental organization "Minproekt" had secured contracts in China for the opening up of two enterprises for the mining, dressing, and refining of lead and zinc, for which all the requisite plant and machinery would be made in Bulgaria.

It is now announced by the official Chinese news agency that the first of these, at Si-din, in the province of Kwangsi, in south China, a flotation plant with a daily capacity of 400 tons, has been completed and was formally set in operation on February 24.

A lead-zinc enterprise with a daily capacity of 1,000 tons of ore, now being established in the province of Liao-ning, in north-east China, is also a Bulgarian contract.

Works and Plant Engineers' Course

Refresher course for works and plant engineers entitled "Space Heating of Industrial and Commercial Premises" will be held at Prestatyn Holiday Camp from May 30 to June 4. The aim of the course is to give a review of the heating systems available and the general methods of calculating the heat requirements of buildings. Reference will also be made to thermal insulation and the Thermal Insulation (Industrial Buildings) Act, 1957. The lectures will be suitable for industrial, hospital, and local authority engineers who have space heating as one of their responsibilities and not so specialized as to require heating engineers of considerable experience to appreciate them. Application forms may be obtained from the secretary of the course, National Industrial Fuel Efficiency Service, Baltic House, Mountstuart Square, Cardiff.

FORTHCOMING EVENTS

APRIL 5

Institution of Plant Engineers: General meeting at the Royal Society of Arts, John Adam Street, Adelphi, London, W.C.2, at 7 p.m.: "Large Span Bridges with Special Relation to the Runcorn-Widnes Project," by J. Kenneth Anderson.

APRIL 5-8

Battersea College of Technology Metallurgical Department: A refresher course, including lectures and discussions, covering "The Structure of Metals and Alloys," directed by A. P. Miodownik and J. Mackowiak.

APRIL 6

North Western Fuel Luncheon Club: Meeting at the Engineers' Club, 17, Albert Square, Manchester 2, at 12.45 p.m. "Nuclear Fuel—the Fuel of the Future," by Sir Leonard Owen.

Combustion Engineering Association (Southern Region): Meeting in London: "The Advantages and Economics to be Derived from Automatic Control on Boiler Plants from 10,000 lb./hr. up to 50,000 lb./hr."

APRIL 6-7

Iron and Steel Institute (Iron and Steel Engineers Group): Meeting at 4, Grosvenor Gardens, London, S.W.1. Four papers on the design and operation of heavy plate mills and their auxiliary equipment.

APRIL 7

Midland Institute of Mining Engineers: Meeting at the Danum Hotel, Doncaster, at 2.30 p.m. "The Strain in Rocks in Relation to Mine Openings," by C. L. Emery.

Manchester Geological and Mining Society: Meeting at Wigan and District Mining and Technical College, at 4 p.m.: "Hydraulics on Armoured Flexible Conveyors," by C. L. Goddard.

APRIL 13

Institution of Mechanical Engineers: Meeting at 1, Birdcage Walk, Westminster, London, S.W.1, at 6 p.m. "Development of Multi-fuel Engines," by G. K. Martlew.

Midland Counties Institution of Engineers: Meeting at the University, University Park, Nottingham: "Mining Subsidence," by L. H. Spencer.

Institution of Electrical Engineers (North Lancashire Sub-Centre): Meeting at the NWEB Lecture Theatre, Jubilee Street, Blackburn, at 7.15 p.m.: "Development of High-voltage Air-break Circuit-breakers with Insulated-Steel-Plate Arc-chutes," by F. S. Fay, J. A. Thomas, D. Legg, and J. S. Morton.

APRIL 14

Combustion Engineering Association (Midland Region): Meeting at the Birmingham Exchange and Engineering Centre, Stephenson Place, Birmingham 2, at 10.15 a.m. "Industrial Space Heating," by F. R. Colton.

APRIL 22

Institution of Civil Engineers: Visit to the civil engineering works of the National Coal Board in the Neath Area, followed by "Surface Reorganization of a Group of Collieries," by G. A. Jones, at the Town Hall, Neath.

APRIL 23

Institution of Production Engineers (North Midlands Region): One-day conference at the Welfare Hall, Rolls-Royce Limited, Derby, at 9.30 a.m.: "The Production Engineer in a Changing Economy."

APRIL 25-29

Compressed Air and Hydraulics Exhibition and Conference: Empire Hall, Olympia, London, W.14.

APRIL 26

Combustion Engineering Association (Scottish Region): Meeting at Galashiels. "Coal to Oil Conversion" and "Utilization of Small Coals."

APRIL 27

Institute of Metals: Meeting at 17, Belgrave Square, London, S.W.1, at 6.30 p.m. "Deformation and Fracture of Ionic Crystals," by Dr. J. Washburn, Associate Professor of Metallurgy, University of California.

Institution of Mechanical Engineers: Annual meeting at 1, Birdcage Walk, Westminster, London, S.W.1, at 6 p.m.

APRIL 27-MAY 6

Fuel Efficiency and Power for Industry Exhibition: Grand Hall, Olympia, London, W.14.

APRIL 28

Coke Oven Managers' Association (Northern Section): Joint meeting with the Institution of Gas Engineers (North of England Section) at the Three Tuns Hotel, Durham, at 7 p.m. "Centralized Control in a Modern Coke-oven Plant," by M. D. Edington and H. Millner.

Combustion Engineering Association (Western Region): Visit to Albion Colliery, Abercynon, followed by a meeting in Cardiff ("Work of British Coal Utilization Research Association").

National Association of Colliery Managers

APRIL 8

Midland Branch: Annual dinner-dance at the Sherwood Rooms, Nottingham; reception at 7 p.m.

APRIL 11

Midland Branch: Meeting at the Mines Rescue Station, Leeming Lane, Mansfield, at 6.30 p.m.: Paper by H. Wright.

APRIL 13

Yorkshire Branch: Annual general meeting at the Miners' Welfare Hall, Brodsworth, at 3 p.m.

APRIL 29

Kent Branch: Annual dinner-dance at the County Hotel, Canterbury; reception at 7.30 p.m.

Scrap and Pig-iron Usage in the US

PRELIMINARY figures issued by the US Bureau of Mines for 1959 show that, regardless of the 116-day steelworkers' strike, there was an increase of 13 per cent. over 1958 in the combined use of ferrous scrap and pig-iron in the United States. Scrap consumption totalled 58,980,000 tons, which was 17 per cent. more than in 1958, and comprised 52 per cent. of the total charge, compared with 50 per cent. in the previous year. Pig-iron consumption, at 55,154,000 tons, was 8 per cent. greater than in 1958 and comprised 48 per cent. of the total charge, against 50 per cent. in 1958.

Provisional figures for steel production and total ferrous scrap and pig-iron used in steelmaking furnaces during last year indicate an increase of 10 per cent. and 11 per cent., respectively, over 1958, for each of these commodities. The use of scrap in steelmaking furnaces during 1959 totalled 44,416,000 tons, an increase of 16 per cent. over 1958; pig-iron consumption in these furnaces totalled 48,839,000 tons—7 per cent. more than in the previous year.

The use of ferrous scrap and pig-iron by grey iron-foundries increased by 24 per cent. and 20 per cent., respectively, over 1958.

Electric-arc Steelmaking at Rotherham

CONVERSION of the open-hearth melting shop at Steel, Peech & Tozer, Rotherham (a branch of the United Steel Companies, Limited), to an electric-arc melting shop—the largest in the UK—is to be the subject of a paper by Mr. A. Jackson, technical adviser on steelmaking to United Steel, and Mr. R. S. Howes, melting shop manager, Steel, Peech & Tozer, at the annual general meeting of the Iron and Steel Institute on May 5.

Reasons for taking this bold decision are explained in the paper, which also gives a survey of the equipment of the new shop.

The meeting will be held at the Convocation Hall, Church House, Great Smith Street, London, S.W.1, starting at 10.30 a.m.

UNDER THE TERMS of a trade and payments agreement, Czechoslovakia and Poland are to export mining machinery one to the other as requisite to supplement the products of their respective engineering works.

MONORAIL HAULAGE SYSTEMS IN MINES

Developments in Handling Materials Underground

By S. A. McKEE, M.I.Min.E.

Problems associated with the transport of supplies underground have largely been superseded by the need to increase production and efficiency of coal-face operations and transport by mechanization and the reorganization of collieries. In this paper, presented to the South Midland branch of the National Association of Colliery Managers on January 4, 1960, the author recognizes the need for improved efficiency in the handling of supplies, outlines the current systems of monorail transport for use underground, and describes an installation of one of these systems at Granville Colliery in the East Midlands Division of the National Coal Board.

PRIOR to 1947 mining techniques at the coal face showed little change from those in existence in the early '20s. Possibly the greatest change was that in the use of coal cutters and belt conveyors. Since 1947, however, great advances have been made in operations at the coal face, with the effort chiefly concentrated towards the production of coal by mechanical means.

Modern machinery has influenced the rate of advance of the coal face and the speed of drivage in stone and coal headings. The change in technique has resulted in greater concentration with the accent on more faces in fewer districts. The method of continuous mining as opposed to that of cyclic mining is in the ascendancy. It is true to say that when techniques change so other problems arise.

That relating to the transport of coal has largely been overcome with the introduction of gate and trunk conveyors to mechanized loading points in the pit bottom or by means of diesel locomotives. Shaft reorganization schemes have done much to improve shaft capacity.

Problem of Materials Handling

While, in many cases, improved efficiency at the coal face and in respect of coal haulage can only be comparatively marginal, the figures of manshifts per 1,000 tons (Table 1) for the East Midlands Division of the National Coal Board for materials handling clearly indicate the size of the problem of materials supply, and the not inconsiderable scope for manpower saving.

Green and Higginson[1] say: "Of all the handling problems in the mine, that relating to the transport of materials, other than coal, is the most difficult and probably, now, the most urgent. It is least capable of regular or orderly organization for the loads vary widely in size and character and the direction and frequency of the movement is largely unpredictable. This is probably the weakest link in the handling system, but it is hoped that the concentrated study it is now receiving will result in improvements in both methods and equipment of an outstanding character. This part of the mechanical handling problem is a particularly difficult one. The provision of an efficient main haulage system of whatever type is child's play compared with the difficulty of finding equipment suitable for moving loads from the loading points to the faces. The problem really has never previously been solved, possibly because it has never really been seriously studied."

The aim must be for greater ease in supplies handling so as to enable quantities of material to be taken to the actual point of use with the minimum manpower, in order that the greater speed of advance can be maintained unhindered by slight delays in getting equipment and supplies to the working place.

Possibly today the amount of materials required for a highly mechanized face is less in quantity, but the need for availability at the right time is much greater in order not to disrupt operations and to achieve maximum machine utilization.

Previous Methods of Handling Materials

Prior to mechanization of coal faces the problem of supplying materials was much simpler, chiefly

TABLE 1.—*Manshift per Thousand Tons for Materials Handling in the East Midlands Division, NCB.*

Area.	Output.	Transport shifts.	M.s.t. for transport.	M.s.t. for materials handling (based on 40 per cent. of column 4).
1	4,088,637	392,124	96	38
3	4,825,748	407,099	84	34
4	4,358,301	326,541	75	30
5	3,044,050	223,663	75	30
6	3,232,579	213,118	66	26
7	3,765,291	253,682	67	27
Division ..	23,314,606	1,816,227	78	31

because the rate of advance of the face was much slower and the daily absorption of materials considerably less. The system of coal haulage was such that it was capable, in reverse, of handling the materials using the same personnel. At this time labour was cheap and plentiful. Conveyor belts were very often used in reverse to take materials to the face. This system was dangerous, had many disadvantages, and the use of it was to be deplored.

The efficient transport of materials by means of diesel or battery locomotives or by means of rope haulages depends to a large extent on good roadway conditions and often proves to be extremely difficult in roadways subjected to movement and subsidence.

Modern mechanized faces have a considerable amount of ancillary equipment in each roadway (Fig. 1), such as conveyors, stage loaders, switchgear, hydraulic pumps, cables, etc., which often prevents tub tracks being laid nearer to the face than about 30 yd. Where such conditions exist it is often found that workmen must manhandle supplies from the end of the tub track to the coal face. In a great many instances the manpower used is highly skilled and consequently requires to be paid an enhanced rate for this work, resulting in an increase in cost.

The problem of supplying rapidly moving faces and headings has recently been given much thought and attention, in an effort to find a system which is simple, efficient, and easy to maintain and requires the least possible number of manshifts to operate. Undoubtedly, the most promising of these systems is that of the monorail. Monorails have been used on the Continent of late years and their numbers are increasing rapidly. Their use in the mines of this country, however, is not so common and, because of this, it is considered that an examination of monorail system will be of benefit. In No. 7 Area of the East Midlands Division of the National Coal Board trials of two of the known systems available have been arranged.

Designs of Monorail

Currently available designs of monorail fall into three main categories, as follow:—

Ground Mounted Monorails.—In civil engineering and building work, ground mounted monorails have been in use for some time. Road Machines (Drayton), Limited, West Drayton (Middx), has produced an adaptation of this machine for use underground and has called it the "Monoveyor." The latter employs a diesel driven engine incorporating carriages with hydraulic motors. The first installation in the country is currently being made at the Donisthorpe Unit in the No. 7 Area of the East Midlands Divisional Coal Board.

Overhead Rope Monorail.—This system differs little from the overhead types of monorail in general design, with the exception that the bogey units are carried on a taut wire rope instead of the normal steel joists or flat-bottom rail.

Overhead Monorails.—Overhead monorails are in common use in many factories in Great Britain. They are generally slow moving and carry light loads into and around many places which would normally be inaccessible with any other type of transport. Overhead monorails appear to have a natural advantage in coal mining since they can be suspended from the roadway supports as the face advances, thereby enabling materials to pass over floor obstructions such as conveyors, switchgear, dints, etc. The movement of supplies on the monorail can be activated by endless rope or main rope. The Rendale, Saarland Company Völkingen (Saar), and Becorit systems provide examples of this type of design.

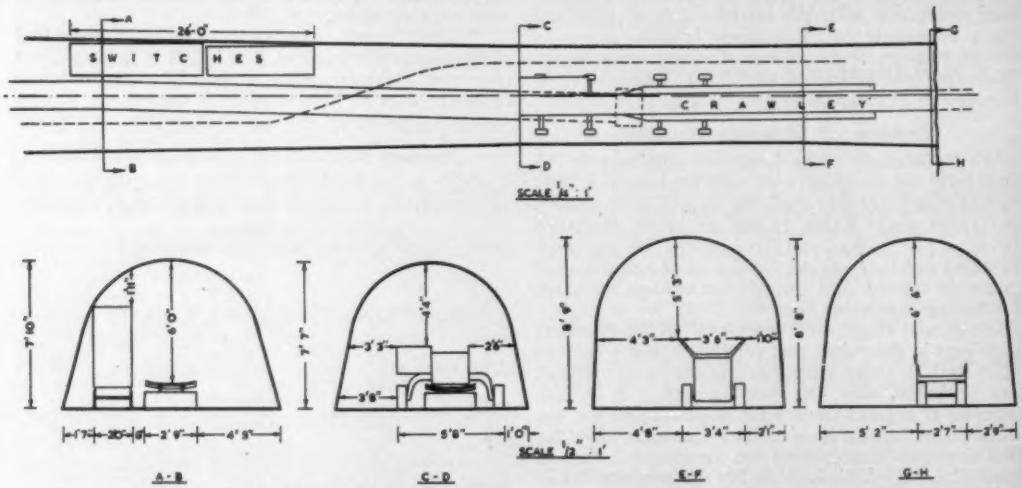


FIG. 1.—PLAN AND SECTION SHOWING MAXIMUM CLEARANCE IN K8'S MAIN GATE, GRANVILLE COLLIERY.

The Rendale monorail system is of British design and is manufactured by Rendale Handling, Limited, Birmingham. It is understood that at the present there is no underground installation.

The system has been developed from the experience gained in various forms of industrial overhead monorail conveyors, and employs a rope haulage which deals with distances of up to 800 yd. The track is constructed from lengths of flat-bottomed rail of 35-lb./yd. section made up in lengths of from 12 to 15 ft. The rails are slung in an inverted manner from the roadway supports and are capable of dealing with unit loads of 1 ton carried between twin trolleys coupled at 3-ft. centres. The rails are suspended from the roadway supports by means of flange clips on the rail attached to adjustable brackets bolted to the arch girder clips. This arrangement allows for roadway distortion as the brackets are adjustable in 1-in. increments. High-tensile steel pins inserted into holes drilled longitudinally into the head of the rail forming the bottom flange of the track at the joints ensures accurate alignment of the bottom flange. Where a joint comes between the roadway support a bridging rail is used to overcome this difficulty.

In order to negotiate bends or to change the direction of the monorail the rails are bent or curved to the required radius.

There are two types of track circuit (*a*) single track and (*b*) double track, the former being generally applicable where conveyors, switchgear, or other obstructions interrupt the free passage of the trolleys running on a return track. Under system (*b*) employing a double track, a duplicate set of trolleys and carriers is used, so that while hauling inbye a group of loaded carriages the unloaded set would be returning outbye along the other track hauled by the return rope.

Two Designs

Haulage winches for either system (*a*) or (*b*) would be identical, except for the horsepower and the speed of travel. There are two designs of winches, one of 7½-h.p. incorporating two motors giving a speed of 75 ft./min. and the other of 15-h.p. also incorporating two motors giving a speed of 150 ft./min. The winches, which are of the double-drum type, form, to all intents and purposes, an endless-rope system when used with a return wheel with the rope spliced at the inbye end. It can be easily seen that no rope splicing is necessary for the extension of the monorail until all the rope on the drum has been absorbed.

The haulage ropes employed with this type of monorail are of ½ in. dia. and of Langs lay construction. The carriages are attached to the rope by a very simple and effective clip, the grip on the rope being actuated by the load on the trolley, such that the greater the load the greater is the grip on the rope. There is also an automatic device for disengaging the rope clip.

Safety features for the Rendale monorail system follow the design of that operating on vertical passenger lifts. Should the rope break when the trolleys are on steep gradients a caliper type of brake comes into operation and grips on the monorail, thus holding the carriages. The brake is actuated from a load arm and the haulage rope. The control of the haulage motors from the unloading and loading points is by means of push buttons and defeat buttons suitably interlocked or, alternatively, by means of trip wires connected to limit switches mounted on the winch, and starting arrangements interlocked with suitable audible or visible warning devices. Appendix I gives the schedules of estimated cost of the Rendale system.

APPENDIX I.—*Schedules of Estimated Costs of Rendale System.*

System (a).—Single-track Major Winch 800-yd. Installation:
Incorporating one set of 15 pairs of trolleys and carriers and 100 ft. of single dead track each end. Handling rate: 15 tons/hr.; speed: 75 ft./min.

	£	s.	d.
Initial outlay (winch, trolleys, carriers, and dead track)	2,573	0	0
Track material/ft.	1	2	4
Erection of track/ft.		5	0
Initial outlay (expressed/ft. over 800 yds.)	1	1	8
Cost/ft.	£2	9	0

System (b).—Double-track Major Winch 800-yd. Installation:
Incorporating two sets of 15 pairs of trolleys and carriers and 100 ft. of double dead track each end. Handling rate: 30 tons/hr.; speed: 150 ft./min.

	£	s.	d.
Initial outlay (winch, trolleys, carriers, and dead track)	3,414	0	0
Track material/ft.	2	4	8
Erection of track/ft.		10	0
Initial outlay (expressed/ft. over 800 yds.)	1	8	4
Cost/ft.	£4	3	0

System Operated by the Saarland Company Völkingen (Saar)

A monorail roadway system[2] specially developed by the Saarland Company Völkingen (Saar) for the transport of timber and other bulky materials in gate roads is in use. In some coal mines in the Ruhr district of Germany the rail is clamped to the steel arches of the roof support and it is possible to deflect the individual sections by 8 deg. from a straight line so that by the use of four short sections a curve with an angle of 32 deg. can be negotiated.

The wheels of the travelling carriages are guided by the web and the flanges of the rail girder, and it is claimed that derailment is impossible. The load is carried by two travelling carriages, while a third carriage houses a drum with 1,500 ft. of spare rope so that the range of haulage can be extended up to 750 ft. The rope speed is up to 10 ft./sec. and up to 70 tons can be hauled over a distance of 1,600 ft. in one shift with only one or two operators.

Becorit Monorail System

According to current information, there are only four installations of the Becorit monorail system in Great Britain, the first of which was introduced into Nantgarw Colliery, Area No. 5, South-Western Divisional Coal Board[3]. This design of monorail is now being manufactured in Great Britain and is modified slightly from the German version employed at Nantgarw Colliery.

The monorail consists of a number of rails 8 ft.

in length with a steel joist section of 4⅛ in. by 1⅛ in. with brackets and chains, together with a number of bogey units and transporter carriages. Included also are curved rails and switches to allow the monorail to negotiate bends of up to 90 deg. and in order to form passbyes, etc.

The type of rail manufactured in Britain was originally 8 ft. long and of 35-lb./yd. section. Welded to the rail is an angled bracket to which the carrying chains are attached. It has since been proved that this length of monorail is not entirely satisfactory if the support centres are not in multiples of 2 ft. This design of monorail is capable of carrying a load of 1½ tons per set of bogies. Where two sets of bogies are used a weight in excess of 1½ tons can be carried if the load is distributed between the two bogey sets. At the end of each rail is a flexible joint. The monorails are suspended from the arched or straight girders forming the roof supports by cleats and chains, the elevation of the rail being determined by roadway conditions. Where the road is high and the full length of the suspension chain is used there is a greater tendency to lateral movement, which can be minimized by using two cleats and two chains to form a triangle with the apex at the chain bracket or by using rigid tie bars at intervals along the rail immediately in front of or behind the rail bracket.

Distortion of the roadway supports has little effect on the monorail system as each joint, being flexible, is capable of articulation either vertically or horizontally to some 15 deg. If distortion of the supports does take place and adjustment is required links of the suspension chain can be taken up or let down.

A simple and efficient arrangement of switching the monorail has been devised. This arrangement allows for rapid and easy changes of direction and is useful for the formation of passbyes.

The complete bogey unit for the system (shown in Fig. 2) has two channel brackets each fitted with two roller bearing wheels which run on the head of the rail. The carriage is swivel mounted on to the bogey and is designed so that the bogey is free to move independently of the main carriage bar connecting the two pairs of bogies. The distance between the two sets of wheels is approximately 5 ft. the design of the bogies being such that derailment is impossible.

The bogey sets are lifted on to the rail by, first, tilting them sideways to hook the flanges of the wheels over the rail head and, then, swinging the bogey down through 90 deg. to the vertical operating position or, alternatively, by sliding the bogey sets over the end of the rails. The distance between the two wheels in each bogey, together with the deep flange of each wheel in relation to the limited clearance on the inside of the bogey frame to the inside of the rail prevents derailment.

To remove the bogies they must be slung sideways until almost horizontal in order to lift them clear. The two bogies are connected together by a strong distributing beam which is fully articulated at each end to allow the bogies to negotiate bends in the vertical and horizontal plane. From each suspension beam is hung any one of the types of carriages described later. Alternatively, heavy loads, such as transformers, switchgear, and electric motors, can be slung directly from the carrier beams.

The carriages are connected together by short connector bars or chains which have shackled ends designed to allow the carriages to negotiate bends. The types of carriages at present in use are as follow:—

Arch girder carrier.—This is a simple frame slung below the suspension beam which holds any usual size of arch and is capable of carrying six or more pairs of arch sections.

Side-tipping dirt car.—This resembles an aerial ropeway car and can be used at repair dints and back rippings; the capacity of the car is 30 cwt. and the method of emptying the dirt is by tipping sideways at some convenient point outbye into mine cars or on to a conveyor belt system.

Solid-type skip transporters.—This carriage is a flat-bottomed tray (Fig. 3) used to carry small

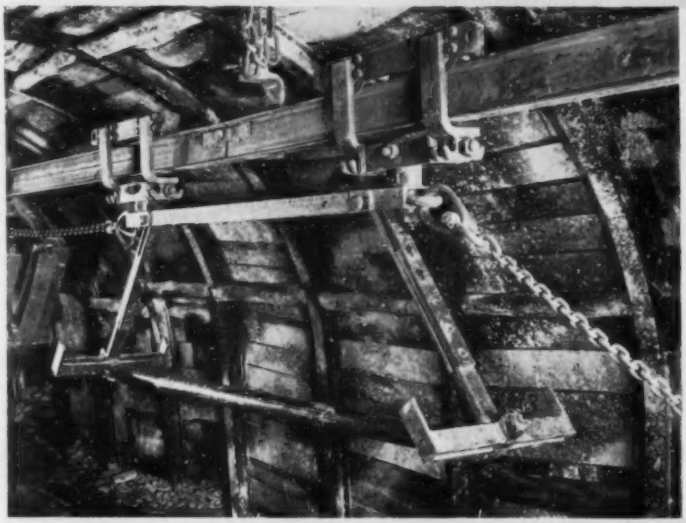


FIG. 2.—THE BECORIT BOGEY UNIT SHOWING ARCH GIRDER TRANSPORTER.

material such as props, bars, lids, and general face supplies.

Wooden prop transporter.—A pair of suspended hoops are used to sling approximately 12 wooden props of 6 ft. in length or more at approximately 12 a time.

When operating on downhill gradients the loads on the monorail, as at present designed, rely entirely on the factor of safety of the rope.

A device has been designed whereby a jack catch is in the "on" position until the person in charge of the monorail is satisfied that the rope or clip is attached securely to the carriages or the rope. When this has been done the catch is released and allows the loads to proceed down the gradient. In other instances jack catches are provided at specified distances along the gradient. These catches, however, have the disadvantage of not being able to operate while the loads are travelling downhill and, therefore, must be set down in order to allow the bogies to pass over them. When the carriages are proceeding uphill the catches are in the "on" position and are effective in preventing a run-back.

The frictional losses on the monorail are so small that the loaded carriages can be easily moved by one man where the roadway is level and quite long distances can be hand-trammed without hardship, which would be impossible with the conventional tub system. Where, however, gradients or undulations have to be negotiated a haulage is necessary. The method generally adopted in Germany is to use the main- or tail-rope system of haulage (Fig. 4). There is no indication at the moment, however, that an efficient endless rope haulage system has been devised.

FIG. 4.—MONORAIL OPERATED BY AN ENDLESS ROPE HAULAGE SYSTEM AT GRANVILLE COLLIERY.

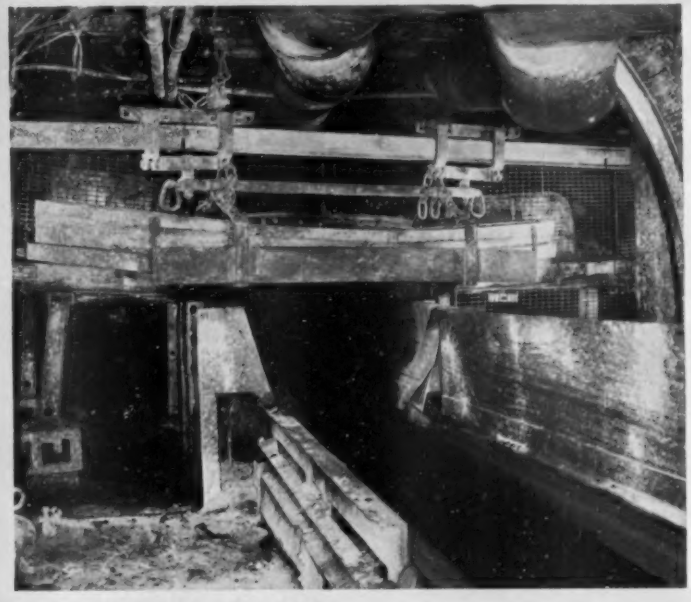


FIG. 3.—SOLID SKIP TRANSPORTER PASSING OVER K8's JUNCTION, GRANVILLE COLLIERY.

Becorit (G.B.), Limited, Nottingham, which markets this unit, is developing a self-contained endless rope system, which it is hoped will be such that no persons will be required to accompany the load when in motion. Also being designed is an automatic brake which will immediately operate in the event of rope breakage.

A recent development is that of the Hunslet diesel MT25 flameproof mines tractor. This machine is of small dimension, is extremely mobile, and is capable of working on steep gradients. It would seem that it is ideally suited as a means for moving a load on a monorail system. It does, however, suffer from the same disadvantages as the diesel loco and tub haulage in moving ground near the face and where switchgear, etc., constitute obstructions.

Installation of Monorail at Granville Colliery

Following a visit to Nantgarw Colliery it was decided initially to install 1,000 yd. of the Becorit

type of monorail in K7's and K8's districts in Little Kilburn Seam, Granville Colliery (Fig. 5).

The monorail in the first instance is being installed in the supply gates and main gates, which are without gradient. The coal is mined in the Little Kilburn Seam by the Anbau Hobel coal plough and the major part of the face supports, together with the conveyor advancing arrangements, are hydraulically powered. The switchgear and equipment necessary for the application of these machines is considerable and with the gate conveyors, stage loaders, etc., form obstacles to the supply system, which are extremely difficult to negotiate by normal methods for a distance of up to 40 yd. from the face. Although the monorail has been at work for only a short time at Granville Colliery, the installation has already effected a saving in manpower. It has also eased the load on the persons doing the irksome job of getting materials to the face.

Before the installation of the monorail the supplies at Granville were taken by endless haulage through the return airway for a distance of 1,970 yd. to a point of intersection of K7's and K8's supply gates. The supplies required for each gate were then distributed and left at the outbye end of the gate.

This work was done by a team of three men. On the afternoon and night shifts a further team of two men, on each shift, transported the material from the outbye end of the gates to the face and the face lips by means of pony haulage, and in the case of the gates by hand transportation from the outbye end of the switchgear.

The present method is to bring the supplies by endless rope from the shaft through the return airway to a supplies station at the junction of K7's and K8's gates. At this point the loads are transferred from the endless rope system to the monorail.

Time tests taken have proved that two men transferred two complete sets of arch girders, 50 cover boards, 12 struts, and two sets of fishplates on to the monorail transporter at the outbye end of K7's supply gate, pushed them forward a distance of 320 yd., unloaded the material at the lip and returned with the empty transporter to the outbye end of the supply gate in 20 min. A similar amount of supplies was loaded and transported from the same point for a distance of 162 yd. to K8's face and the empty transporter returned to the point of loading in 9¼ min.

The type of arch girder transporter in use at Granville is capable of carrying, at one time, six complete sets of arch girders. It can easily be seen, therefore, that one week's supply of arches, etc., can be taken to the face in a relatively short time.

It is anticipated that when the installation in these districts is completed the faces and the gateways will have one week's supply of materials dealt with in one day. It is also anticipated that a team of four men will accomplish this task, which will constitute a saving of 15 man-shifts/week.

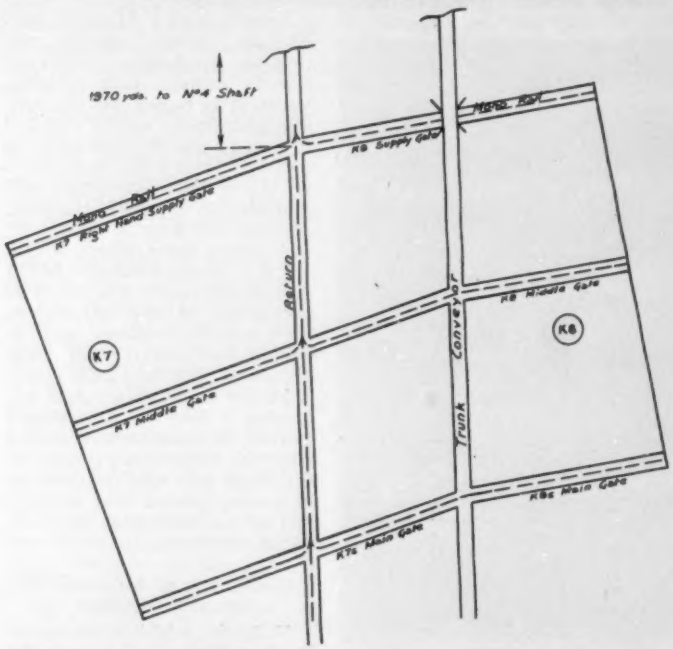


FIG. 5.—PROPOSED INSTALLATION OF MONORAIL SYSTEM AT GRANVILLE COLLIERY.

Method of Erection

The initial installation of the Becorit monorail requires only semi-skilled labour under the guidance of the manufacturer's service engineers. Extensions to the system can be carried out by unskilled labour at the face.

To extend the rail a girder clip is attached to the support nearest to 8 ft. from the end of the last rail and a chain suspended from it. A new 8-ft. length of rail is lifted into position and one bolt secures one end of the existing rail to the new rail; one bolt anchors the other end to the suspended chain. Where the end of the rail comes midway between two arches two suspension chains are used, one securing the end of the rail to each arch. In this way the sideways swinging of the rail is minimized. The increased number of hanging points at bends has the effect of making the rail almost rigid to sideways movement, but at the same time allows vertical

deflection in the event of any arch distortion.

The monorail was installed at Granville at a rate of 40 yd./hr. for three men—two men erecting while the third man performed the duties of supplying the monorails and laying them forward. This figure was affected by the roof support centres being at 3-ft. intervals and the lengths of monorail at 8 ft. It is quite certain that this figure of erection could be substantially improved if the monorail lengths were in multiples of 3 ft.

At one point in K8's roadway the centres of the supports were 2 ft., and 8 yd. of monorail were erected in six minutes.

The labour cost of installation at Granville worked out at approximately 6d./yd. In order to compare the cost of monorail installation against that of laying a conventional tub track a test was taken. Two men laid 60 yd. of rail with sleepers at every yard, and fishplates at the joints, in one shift. The labour cost of this roadlaying was 1s. 2d./yd.

Transference of Materials

It is inevitable except in the case of a new mine that a transference from one system of haulage to the monorail must take place, necessitating also the transference of materials. Past experience has proved that where transference has to take place heavy labour costs and time are incurred. It is essential, therefore, that some arrangement is made to carry out the transference as quickly as possible.

A suitably constructed trans-shipping station seems to be essential. This station should be equipped with lifting gear in order that the loads can be moved readily from one system to another. An arrangement has been made at Granville whereby the tub bodies are easily detached from the tub chassis. By suitably grading the tub and monorail tracks it is possible for the supply tubs from one system to be hauled under the monorail. The chains on the monorail transporters can then be attached to the tub bodies, the bodies detached, and transported forward to the face. Where heavy equipment, such as conveyor motors, conveyor gears, heavy section arch girders, etc., are required to be transferred, suitable lifting arrangements are incorporated in the monorail carriages.

It will be seen from Appendix II that the prime and installation costs of the Becorit monorail system is considerably less than that of a conventional track and rope haulage system, the costs being based on a level mile of roadway. The figures submitted are realistic on the experience gained at the Granville Unit in Area No. 7 of the East Midlands Divisional Coal Board.

APPENDIX II.—*Comparison of Costs of Monorail with Conventional Haulage.*

Comparison is made for a British-made Becorit monorail (made at Brown, Lennox & Company, Limited, Pontypridd), and conventional track and rope haulage supply systems for an installation 1,800 yd. long.

BECORIT MONORAIL

	£
Monorail, with flexible joints, hanging chains, brackets, and arch clips, £5,053, less 28 per cent. import duty ..	3,947
Labour, 6d./yd.	44
Pikrose 20-h.p. haulage	860
Rope	259
	5,110
Allow for two curves, say	5,200

Or £3 per yd.

CONVENTIONAL

Track (35-lb. rail at £42 7s. 6d. per ton; sleeper at 17s., 1-yd. centres, 2,400 bolts)	4,170
Trams, say, 10 at £80	800
Haulage engine (45 h.p.)	2,200
Rope (3,800 yd.)	519
Labour (track laying, two men at 60 yd. per day, plus engine); erection, no allowance for engine house ..	250
	7,939
Say	8,000

Or £4 8s. 4d. per yd.

Further Applications of Monorail Haulage

It is suggested that the monorail system will prove of benefit in the following instances:—

(1) As the means of supplying rapidly driven headings, *e.g.*, continuous miner headings.

(2) For moving supplies in roadways which are

FIG. 6.—MONORAIL BY-PASSING SWITCHGEAR, CONVEYOR BELTS, AND OTHER GATE-END EQUIPMENT.

undulating and winding and where the roadways have obstructions such as heavy switchgear equipment, etc.

(3) In roadways subjected to heavy floor movement.

(4) In roadways where heavy repair work has to be undertaken, especially where there are a number of canches in a comparatively short length.

(5) In roadways being salvaged. The installation of the monorail would allow for the equipment in the district to be taken out in any order at the choice of the management. For example, the gate conveyors should be dismantled and removed first, without prejudicing the removal of other equipment at a later date. Too often gate conveyors are used as a means of transport for salvage.

(6) The monorail is suitable for suspending switchgear over the conveyor and greatly reducing the time effort required to move this equipment forward.

Advantages of Monorail System

Overhead monorail systems reduce the number of necessary off-loading points. It is simple to install a monorail to transport materials over conveyors, machinery, switchgear, and gate-end equipment, as shown in Fig. 6. In normal tub track systems this would require material being transferred from one set of tubs to another with a consequent waste of manpower.

The flexibility of the system and the easy installation of passbyes enables more material to be moved in a given time than with the conventional type of tub track systems and can more readily be delivered to the point of consumption (Fig. 7).

Varying types of materials can be moved without the expense of many different types and sizes of tubs. Heavy machinery can be suspended from the bogey carrier bars and can, if necessary, be distributed between several sets of bogies.

Manriding can be applied on the same system as the material transport system and can be effective right up to the coal face. Monorail systems would seem to be safer than tub track systems from the point of view of derailment and also from the fact that the overhead monorail offers less obstruction to the walking way in roadways.

The monorail can be used for the transport of stretcher cases immediately from the coal face.

Limitations of Monorail

Due to the restriction of the loads being limited to 1½ tons/bogey, the monorail cannot, as yet, be universally applicable for all loads. Thus, alternative systems may be necessary for the odd piece of heavy equipment which cannot be broken down to smaller unit loads.

Manriding is not possible at the present time with the existing design due to the lack of a safety device to apply brakes in a downhill run in the event of the rope failure or over speed.

The author wishes to thank Mr. W. Unsworth, Area general manager, No. 7 Area, East Midlands Divisional Coal Board, for permission to read this paper, and also Becorit (G.B.), Limited, Nottingham, and Rendale Handling, Limited. Any opinions expressed in this paper are the author's and not necessarily those of the National Coal Board.

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DISCUSSION

MR. H. B. BENNETT, in congratulating the author, thought that to get the full benefit from a monorail system it would be advisable to run continuously from the stockyard, through the mine roadways (particularly in the case of drift mines) right to the coal face, thus avoiding any change points. It was tempting to try this experiment at a small drift mine about to be brought into production, even if it meant authorizing manriding on the conveyor systems.

Mr. Bennett asked if the author considered the monorail would adequately meet the whole needs of the pit, *i.e.*, heavy materials, etc., without having to duplicate it with conventional tub track systems.

The AUTHOR agreed that in order to get the full benefit from the monorail system it would be advisable to run continuously from the surface stockyard through the mine to the coal face and, if possible, avoid any

FIG. 7.—SUPPLIES DELIVERED TO FACE RIPPING LIP.

transference of materials. This was more easily accomplished in the case of drift mines.

The monorail in its present form would not adequately supply the needs of a pit, more especially if the pit were a large one, but he was certain that in the near future the monorail would be designed to carry heavier loads at a considerably lower cost than any of the methods known today.

In reply to MR. E. W. BOSWORTH, who asked if the moving parts of the monorail system were included in the manager's scheme for maintenance of the mine, the AUTHOR replied that they should be included in the maintenance scheme since there was so little to maintain and examine.

MR. D. SMITH asked for details of a self-contained diesel-driven bogey. The AUTHOR replied that he had no details of a system where the motive power for the bogey was in the bogey itself. He did not favour a diesel-driven bogey on the monorail system because of difficulties it might present; for example, if HM Inspectorate considered the diesel-driven bogey to be a diesel locomotive, many exemptions would then be required in order to allow the monorail to operate universally. He favoured the endless rope as a means of propulsion in overhead monorails.

MR. R. G. JACKSON noted that the installation at Granville was on recently set arches and asked if any special precautions were taken and if future installation would affect arch design. Replying, the AUTHOR said no special precautions were taken where the monorail was attached to recently set arches. The arches were not stilted. Where stilting took place, he advised that the monorails be suspended from roof bolts. He could not say whether monorails would have any effect on future arch design.

MR. T. A. C. WILLIAMS said that loads of 1½ tons per carrier had been carried and a number of carriers could be connected together. There also seemed to be a tendency to increase on such loading in Germany. As these were "live" loads, Mr. Williams asked what the limiting factors would be on newly set arches at the face-ripping lip and, as it had been stressed that this appeared to be a safer system, if there was any possible reduction in cost through a reduction in the number of manholes required.

Each bogey would take a load of 1½ tons, said the AUTHOR in reply; if the load was distributed over a pair of bogeys, the load could be increased to 3 tons. He had no knowledge of the limiting factors on newly set arches, but he felt that newly set arches would withstand the loads imposed on them. With regard to manholes, the law made no reference to monorail systems: until the law was changed manholes would be required where monorail systems were installed.

MR. L. J. MILLS said that the monorail had a tremendous potential in respect to salvage operations. Too often there was a tendency to draw off a district using a gate conveyor for transport. Apart from tying up valuable capital equipment for a purpose for which it was not designed, recent method studies on salvage operations had shown that the use of a gate conveyor was not the most efficient nor the quickest means of transporting salvage material. Cases had occurred where due to the onset of spontaneous combustion, it had been necessary to erect seals before all the equipment had been withdrawn. With the monorail it would seem that this should never happen.

The AUTHOR agreed and said the installation of a monorail system would pay for itself if installed for no other purpose than salvage.

MR. W. E. JONES said that one of the chief advantages of the monorail system seemed to be its use in taking supplies right up to the ripping lip in roadways containing conveyors, stage loaders, etc. The author had shown that this was achieved by using a low-type bogey. He asked if the payload of this bogey, particularly regarding large arches, was high enough to justify its use from the stockyard to the face in a small drift mine.

Replying, the AUTHOR said the flat transporter could carry four to five sets of arch girders. It was quite simple to design a type of transporter to carry greater loads to justify the use from the stockyard to the face in small drift mines.

MR. G. E. KIRBY asked what was the maximum radius of curve that the monorail carriages could negotiate and if the monorail system could be safely adapted for manriding. The AUTHOR replied that the monorail carriage could negotiate curves of up to 90 deg. and that the system could be safely adapted for manriding.

MR. H. G. MITCHELL asked for details of the device to arrest the bogey in the event of rope breakage or the rope becoming detached.

Replying for the author, MR. A. M. HOWARD of Rendale Handling, Limited, said that the Rendale equipment employed an endless rope system with both outhaul and return ropes running overhead adjacent to the rail track, the load trolleys being equipped with hinged arms from which the loads were suspended operating gripping jaws, such that after passing over rope ramps at either loading or unloading ends and securely attached to the rope for haulage, it was impossible for the rope to become detached unless the load was lifted bodily and the load arm relieved of all weight.

The automatic caliper type safety grips fitted to trolleys operating over gradients comprised twin cams with serrated faces mounted on one trolley of a coupled pair and fitted with closing springs, which if unrestrained, would pull the cams into a gripping contact with the sides of the track rail.

These were held apart by a linkage operated from a cam lever connected to the load arms such that at the loading or unloading ends, with the load arm pinned up in a disengaged position, the cam lever opened up the safety grips. After the load trolleys had passed over the engaging ramps and the load arm allowed to descend, gripping the haulage rope, the cam lever then bore on the haulage rope close to the load arm, gripping it and holding the caliper safety grips free of the track rail during the haulage. Should rope breakage occur, allowing the cam lever to fall, the closing springs, relieved of resistance, then acted upon the cams and brought the serrated faces into gripping contact with the rail track to arrest and hold the trolleys with their loads.

In reply to Mr. H. WILCOCK, the AUTHOR said that monorails were not used for manriding underground, but had been used for some time to transport people on the surface.

British Council Report, 1958-59

During the past five years the gross annual income of the British Council almost exactly doubled, from £3,000,000 to £6,000,000, states the council's annual report for 1958-59, issued recently. Geographically the main work is directed towards the developing areas of the world, particularly in the Near and Middle East, South and South-East Asia, and the new States of Africa. Of its total resources, the British Council devotes about four-fifths to work connected with the developing areas, and the remainder in Europe, where work has been extended in the German Federal Republic.

Ships Reborn

GROWTH in world steel production, coinciding with a world-wide shipping depression, has caused a rapid increase in the amount of tonnage being broken up. Few steel companies can boast their own shipbreaking yards to take full advantage of this source of steel scrap as can the Bethlehem Steel Corporation.

The world's largest shipbreaking yard is owned by Bethlehem Steel's Patapsco Scrap Corporation, and located at the upper end of Chesapeake Bay, in Baltimore, Maryland. Prior to 1946 this was the famous Bethlehem-Fairfield shipyard, which delivered over 500 vessels during the war, and by 1945 was producing 10,000-ton Liberty ships within 30 days. In 1946 the yard was purchased by Bethlehem Steel, and now welcomes many of its original products for demolition.

Of the 16 building slipways, seven are in use, and battleships, aircraft carriers, submarines, liners, and cargo vessels have all occupied them. Included in the equipment at the slipways are several cranes of up to 75 tons capacity, and one of the largest automatic scrap shears in the world, specially designed by Patapsco, which can cut up to 50 tons of heavy ship plate an hour into suitable sizes for charging into open-hearth furnaces.

THIS UNUSUAL VIEW OF THE USS MISSISSIPPI'S BOWS, TIED UP AT A PATAPSCO SCRAPPING PIER PRIOR TO HER DEMOLITION, STRIKES A MACABRE NOTE. THE 32,000-TON VETERAN OF TWO WORLD WARS TOOK FIVE MONTHS TO BE BROKEN UP AND YIELDED 24,600 TONS OF FERROUS SCRAP.

The scrap itself is shipped to Bethlehem's five eastern steelmaking centres, the bulk going to the nearby Sparrow's Point plant. Some idea of the amount of tonnage handled can be gained from the fact that some 380 ships, yielding 820,000 tons of scrap, were broken up in the corporation's first 12 years. In addition to vessels, a number of tanks, trains, and railway wagons have reached the yard. At one stage, 1,800 tanks were waiting demolition, and 1,150,000 tons of "battlefield scrap."

Some famous vessels have ended their lives at Patapsco. The breaking up of the luxury passenger vessel Veendam, for example, after 30 years and 2,000,000 miles of cruising, led to a flood of requests from former passengers for souvenirs. In that case, over 500 of the liner's stateroom keys were polished and sent to the applicants. The tanker Gulfking, after 28 years at sea, returned to the pier whence she had been first outfitted. After her superstructure was removed, she was pulled on to the original slipway from which she had been launched, where the cutters included four men who had helped in her construction in 1921. To complete the cycle, a new Gulfking was launched in 1957 from Bethlehem Steel's Sparrow's Point yard, and the owners were handed the bronze builders' plate from her predecessor, this forcibly demonstrating the point that Patapsco is more birthplace than graveyard.

Steels for Nuclear Reactor Power Circuits

CONTRIBUTIONS from Canada, the UK, the USA, and the USSR are expected for a symposium on "Steels for Nuclear Reactor Power Circuits" being organized by the Iron and Steel Institute. It will be held at the Hoare Memorial Hall, Church House, Great Smith Street, London, S.W.1, from November 30 to December 2. The symposium will be included in the activities of the British Nuclear Energy Conference, of which the Iron and Steel Institute is a member.

The symposium will be divided into the following sessions:—Factors governing selection of steels; fabrication aspects; irradiation effects; high-temperature properties; corrosion and steels for future reactors.

Government of Technical Colleges

A booklet, issued by the Joint FBI—Technical Colleges Committee under the auspices of the FBI Education Committee, gives, from industry's viewpoint, an appraisal of the government of technical colleges in the UK. The position is looked at in the light of industry's rapidly growing needs for trained technical and commercial staff and the consequent necessity for increased consultation between industry, commerce, and the colleges. Recommendations based on these considerations and on a sample survey of conditions prevailing in a number of colleges are given in the first section, while other sections of the booklet deal with the finance of technical colleges in this country, the academic pattern, and the structure of UK technical education and the historical background to it.

Temperature of Molten Steel

Experiments in Continuous Measurement

Tungsten-molybdenum thermocouples, shielded with zirconium dioxide base protective sheaths, have been used successfully at the Erov integrated steelmaking plant for the continuous measurement of metal temperatures, in an open-hearth furnace and in the teeming ladle. The subject is discussed by P. Ya. Sorokin in Metallurg, 1959, No. 12, from which the following extracts have been taken.

DISTRIBUTION of elements between molten slag and steel, and likewise the solubility of gases in the metal, which to a large extent influence its quality, are directly related to temperature, for the continuous measurement of which, in the furnace during refining and in the ladle during casting, there is a pressing need.

The protective sheaths which are used at the present time for shielding the hot junctions of thermocouples, made from fused quartz and alundum, do not, however, satisfy the demands. The quartz sheaths soften and disintegrate in the molten steel and in practice permit only one temperature measurement to be made. The alundum sheaths, although they are more refractory, are at the same time less reliable than the quartz, since they split open and also go to pieces during immersion.

Zirconium Dioxide Sheaths

The Institute of Metallurgy of the UFAN (Academy of Sciences of the Urals Federal Republic) during the years 1952 to 1955 developed protective sheaths for thermocouples based on zirconium dioxide; they have considerable stability at high temperatures and high refractoriness, do not split open on immersion in the absence of preparatory heating, and their thermal conductivity with a wall thickness of 3 mm. enables them to reach steel temperature in 60 to 70 secs.

Laboratory tests of the properties of these protective sheaths for thermocouples were carried out in a high-frequency furnace. During the first experiments thermocouples protected by sheaths of zirconium dioxide were inserted through the bottom, inside the magnesite-covered bath in which the steel was melted, and held in the molten state. After each melt the magnesite was cut away to allow observation of the protective sheath of the thermocouple. It was established that after these sheaths had been in the molten steel for a period of 2 hr. at temperatures up to 1,780 deg. C. they remained unbroken. In a second batch of experiments, thermocouples protected by sheaths having a zirconium dioxide basis gave satisfactory temperature measurement of four melts, covering a period of 15 hr.

Measurement in the Ladle

Experiments in the continuous measurement of the temperature of steel in the ladle were carried out in co-operation with the Urals Wagon Construction Works, an engineering construction concern and the A. K. Serov iron and steel combine at Serov.

At the first works, the hot junctions of the assembled thermocouples were inserted into the ladle through a dummy stopper or through the bottom or side of the ladle. The measurements showed that the temperature of the upper layers of the metal in the ladle was higher than the temperature of its lower layers, the drop in temperature between the upper and lower layers in 30- to 45-ton ladles being from 100 to 125 deg. C., and on an average of 15 melts in a 45-ton ladle it amounted to 77 deg. C. The experiments showed that whereas the temperature of the metal in the ladle, as measured by a continuously operating thermocouple, in fact rises towards the end of pouring, the temperature of the steel, as determined by an optical pyrometer, drops regularly, in accordance with normal concepts of what happens.

Open-hearth Temperature Measuring

Experiments in the continuous measurement of the temperature of the molten steel during the course of a melt were carried out in an acid open-hearth furnace at the Serov plant. A continuously operating thermocouple having a junction of tungsten and molybdenum wire made by the Institute of Metallurgy, of the UFAN, and an ordinary immersion couple were assembled in a water-cooled tube, protected from direct contact with the metal by normal chamotte stopper tubes adapted for this purpose. The thermocouples were introduced into the furnace through the inspection window of the charging door, their hot junctions being immersed in the metal to a depth of 100 to 125 mm.

It was shown that the temperatures measured by the two thermocouples differed by 10 to 12 deg. C. The continuously operating thermocouple was unprotected by any neutral gas atmosphere. This experiment permits the conclusion that a change in the thermal electromotive force of the electrodes of tungsten and molybdenum wire due to their presence in the molten metal for a period of 40 min. and even longer cannot create any objection to the conduct of continuous measurements of the temperatures of molten steel. It was observed that the thermocouple responds sufficiently quickly to the drop in temperature of the bath which occurs as a result of the addition of a considerable

quantity of solid ferro-chromium to the liquid metal.

After protective sheaths had been in a furnace for periods of 65 and 88 min., the chamotte stopper surrounding the sheaths to which they were assembled was eroded over the whole of its surface to a depth of 5 to 6 mm., while the sheaths fabricated on a basis of zirconium dioxide were preserved intact.

The experiments carried out at the A. K. Serov iron and steel combine show that it is possible to develop continuous measurement of the temperature of molten steel in an acid furnace by means of thermocouples, where their hot junctions are protected by sheaths fabricated on the basis of zirconium dioxide, and the water-cooled tube is insulated by chamotte refractory tubes. For continuous measurements of molten steel in basic furnaces it is necessary to fabricate reinforced insulating tubes in a basic refractory material.

[A translation of the complete article is available. Inquiries should be made to the Editor.]

News from Australia

Tinplate for Victorian Canneries

KNOWN as the "Tinplate Express," a special train has begun a shuttle service between Port Kembla (NSW) and Albury, carrying tinplate for the Victorian canneries. The contract to carry the tinplate was one of the largest the railways had gained since the last war, said Mr. N. McCusker, the Commissioner for Railways. Before the Port Kembla plant of Australian Iron & Steel, Limited, began producing tinplate, supplies had to be imported from oversea, he said.

Thirteen new sealed louvre vans had been strengthened and painted an aluminium colour for the service. Two diesel locomotives would be used to haul the 780-ton train up the 2,200-ft. climb between Port Kembla and Moss Vale. One locomotive would take the train on to Albury and on the return trip to Port Kembla. The tinplate would be packed in 3-ton packs and special precautions taken to prevent "shimmying" or discoloration of the metal. The tinplate will be transhipped under cover at Albury for transport to canneries at Shepparton, Bendigo, Kyabram, Boorcan, Dorrington, Maffra, and Traralgon.

Mr. E. E. Tomlinson, chairman and managing director of Tomlinson Steel, Limited, Perth (Western Australia), is making a business tour of the United States and the United Kingdom and other European countries to secure manufacturing licences for light and heavy machinery which can be built in Australia. The move will assist Tomlinson's diversification programme. Tomlinson Steel at present manufactures, under licence, Cleaver Brooks oil-fired packaged boilers and a wide range of heavy engineering products. A new divisional office of Tomlinson Steel is now located at 82, Albion Street, East Brunswick (Victoria). Primarily, the new division will be the Victorian headquarters of the sales and service organization for the Cleaver Brooks packaged steam boilers made by Tomlinson Steel. The marketing of these units in Victoria was previously handled by Crockford & Robertson Pty., Limited.

Tubemakers of Australia, Limited, jointly owned by B.H.P. and two UK companies, Stewarts and Lloyds, Limited, and Tube Investments, Limited, is planning, with the co-operation of Australian Iron & Steel, Limited, and its associated company in the UK, the Stanton Ironworks Company, Limited, an immediate survey of the cast-iron pipe market. Present indications are that modern plants will be established in New South Wales and Victoria, and possibly in other States.

The Rio Tinto organization has taken an option over the manganese leases of Northern Mineral Syndicate, in the Ripon Hills, in the Pilbara mineral field. A camp site is being established for the systematic testing of the occurrences, in which work a helicopter will be used. Rio Tinto Australian Exploration Pty., Limited, is one of the organizations which has tendered for the export of iron ore from Western Australia. The company proposes to mine iron ore from the Mount Goldsworthy deposit in the Pilbara mineral field. A total of six tenders has been received by the Government.

On March 10 the first section (48 ovens) of the new battery of coke ovens began production at Port Kembla. The second section (48 ovens) will commence later in the year. The complete of 96 ovens, together with its associated coal and coke handling and by-products plant, will cost £9,000,000 and give employment at Port Kembla to an additional 288 men.

Erection of the plant, which began in June, 1957, is being carried out for Australian Iron & Steel Pty., Limited, by Simon-Carves (Australia) Pty., Limited. The complete battery of new coke ovens, which has an annual capacity of 680,000 tons, will step up the Port Kembla steelworks' production of metallurgical coke to approximately 1,750,000 tons a year. This coke production will require 2,500,000 tons of washed coal each year, making the Port Kembla steelworks one of Australia's largest coal users.

Gas output from the new battery will be 32,000,000 cub. ft. per day and that of the three batteries, 80,000,000 cub. ft.; 13,500 galls. of tar will be recovered by the new battery, bringing the total daily output of the three batteries to 33,000 galls. This product is used as a fuel in the open-hearth furnaces.

The new battery will produce 20 tons of sulphate of ammonia daily, bringing the total output of the three batteries to 50 tons daily. Light oil production will be brought up to a total output of 14,000 galls. per day, 5,500 galls. of which will be produced by the new battery.

SWEDEN IMPORTED 1,760,000 metric tons of coal, including lignite, in 1959, compared with 1,714,000 metric tons in 1958. Coke imports last year totalled 1,515,000 tons, compared with 1,608,000 tons.

High-speed Tunnel Drivage

Part 2.—A COMPARISON OF LOADING EQUIPMENT

By B. T. HOULDEN, Ph.D.

The performance of various loading machines and systems of tunnel support are compared in the second part of this article on the result of studies made by the operational research group of the National Coal Board during the period 1953 to 1955, in selected NCB, hydro-electric, and German coal industry tunnels. In the first part of the article, which appeared in last week's issue of IRON AND COAL, *the author compared the different drilling methods used. The final part of the article, to appear next week, will outline the organizational requirements for high-speed tunnelling.*

OVERALL figures for loading are summarized in Table 6.

TABLE 6.—*Summary of Loading Details.*

	Time of loading (min.).	Volume loaded (cub. yd. of solid stone).
NCB	47 to 330	8 to 48
Hydro-electric (one tunnel only) ..	87	21
Germany	186	76

The loaders studied were of four different basic types:—Shovel loaders: Eimco 21, Eimco 40, and Conway 60; gathering-arm loaders: MC2 and MC3; reciprocating-shovel loaders: Duckbill, Bergtechnik (German loader with very large shovel sufficient to load over the full tunnel width); and scraper-loader: Joy Sullivan 54-in. Slusher. In all of the hydro-electric tunnels visited, Eimco 21s were being used, and the Bergtechnik loader was used in the German tunnel.

Comparison of Performances Attained

Table 7 gives three sets of figures illustrating the performances observed:—(*a*) Filling rate—the "filling time" is the time during which the tub, mine car, or conveyor behind the loader was able to take dirt and the loader was working to fill out the pile. This rate is, therefore, a measure of the capacity of the loader and not of the method of haulage behind it; (*b*) loading rate "A"—is calculated from all of the time of the loading part of the cycle except those not attributable to face operations (including preparing to load, tub changing, advancing track, derailments, machine breakdowns, etc., but excluding such times as waiting for empties and failure of the power supply); (*c*) loading rate "B"—is calculated from all of the times of the loading part of the cycle.

There is a wide range of performance with different types of loader. Where comparable, filling and loading rates in hydro-electric tunnels are above those for the same loader (Eimco 21) in NCB tunnels.

Table 8 gives the detailed times of loading in NCB tunnels. Table 7 shows that the filling rates were generally higher in hydro-electric tunnels and this is reflected in rate of loading "A." This difference could be due to:—The efficiency of Eimco drivers; suitability of the dirt pile fragmentation for rapid loading; pressure of compressed air (in NCB tunnels the pressure varied between 65 and 80 lb./sq. in. and frequently the capacity was not sufficient to maintain this pressure. In the hydro-electric tunnels the minimum pressure was 90 lb./sq. in.), or the standard of maintenance and hence efficiency of the Eimco 21s.

Although the filling rate of two Eimco 21s is greater when they are filling alternately rather than simultaneously, this is more than offset by the time of waiting for the other Eimco to finish filling each tub. In either case the filling rate per Eimco is less than when only one is working. This presumably is due to the time spent clearing up dirt scattered by the other Eimco. With Eimco 21s loading into tubs about 15 per cent. of the total time of loading is due to tub changing.

Delays not attributable to the work at the face occupied 14 per cent. of the loading part of the cycle in NCB tunnels and 8 per cent. in hydro-electric tunnels. This difference is almost entirely due to waiting for empties.

The filling time represents 28 to 95 per cent. of the time of loading (excluding delays such as waiting for empties), depending on the type of loader used, the method of haulage behind it and the efficiency of working.

Study of the component times of the loading operation shows how improvements can be made to the system observed. For example, if the MC3 loads on to a conveyor and the advancing of this conveyor can be done without delay to the face operation (either by special crew or by using a shuttle conveyor) the rate of loading can be increased to 28 cub. yd./hr. Similarly, with the Eimco 40, loading on to a conveyor as above, 47 cub. yd./hr. should be possible.

The fragmentation also affects the relationship

TABLE 7.—*Loading Equipment and Performances.*

Size of roadway.	No. of tracks at face.	Type of crossing.	No. of tracks behind.	Haulage behind loader.	Capacity of tubs (cub. yd. of solid stone).	Vol. of dirt loaded per cycle (cub. yd. solid stone).	Filling rate (cub. yd. of solid stone per hour).	Loading rate "A" (cub. yd. of solid stone per hour).	Loading rate "B" (cub. yd. of solid stone per hour).
NCB TUNNELS.									
One Eimco 21									
14 ft. by 10 ft.	2	Single	1	Tubs	0.89	42.7	20.8	12.3	9.3
12 ft. by 9 ft. 6 in.	1	"	2	"	0.41	17.9	22.4	13.8	11.9
Two Eimco 21s alternately									
14 ft. by 10 ft.	2	Superimposed plate	2	Tubs	0.47	29.0	20.7	13.2	12.2
14 ft. by 10 ft. 6in.	2	" "	2	"	0.36	24.9	15.9	13.6	13.1
Two Eimco 21s simultaneously									
14 ft. by 10 ft.	2	Superimposed double crossing	2	Tubs	0.52	14.0	14.5	12.7	12.5
14 ft. by 10 ft.	2	Superimposed double crossing (faulty)	2	"	0.43	22.8	12.0	6.7	4.5
Eimco 40H									
14 ft. by 10 ft.	1	Single	2	Mine cars	1.33	21.3	58.1	31.7	9.9
M.C.3									
16 ft. to 17 ft. by 11 ft. 6 in.	—	—	—	Tubs	0.87	47.6	42.0	19.7	17.4
13 ft. to 14 ft. by 10 ft.	—	—	—	Conveyor	—	22.0	33.0	18.9	15.5
18 ft. by 12 ft.	—	—	—	"	—	30.7	39.7	19.3	19.3
15 ft. by 11 ft.	—	—	—	"	—	24.9	31.2†	15.4	14.2
10 ft. by 8 ft.	—	—	—	"	—	19.9	29.1	7.2	4.2
Conway 60									
14 ft. by 10 ft.	1	Single	2	Mine cars	2.13	38.4	35.5	20.1	16.9
Duckbill									
12 ft. by 9 ft. 6 in.	—	—	—	Belt conveyor	—	21.5	14.3	10.3	10.3
14 ft. by 10 ft.	—	—	—	Tubs	0.49	28.4	10.5	8.2	8.0
MC2									
14 ft. by 10 ft.	—	—	—	Belt conveyor	—	8.4	10.3	8.8	5.7
15 ft. by 11 ft. 6 in.	—	—	—	" "	—	11.1	18.0	18.0	14.2
Joy Slusher									
15 ft. by 11 ft.	—	—	—	End tip cars	2.12	46.6	17.7	16.8	8.5
HYDRO-ELECTRIC TUNNELS									
One Eimco 21									
8 ft. 3 in. high by 6 ft. wide	1	MacGregor	1	Skips	0.68	5.4	27.2	10.5	10.5
8 ft. 3 in. high by 6 ft. wide	1	"	1	"	0.68	4.1	22.2	8.4	7.2
10 ft. 6 in. dia.	1	Superimposed single (Californian)	2	"	0.68	21.0	26.3	15.0	14.5
Two Eimco 21s simultaneously									
14 ft. diameter	2	Two singles very near one another	2	Skips	0.42	33.8	14.7	16.6	12.4
GERMAN TUNNEL									
Bergtechnik									
15 ft. 9 in. by 13 ft. 4 in.	—	Traverser	—	Tubs	0.53	76	39	26	24.5

† If refilling of dirt is neglected, figure is 33.9 cub. yd./hour.

between filling and loading rates. Gathering arm and shaking shovel-type loaders are delayed by large pieces of stone (above about ½ cub. yd. volume) in the dirt pile. Shovel type and scraper loaders are only delayed by pieces above about 1 cub. yd. volume (see Tables 8 and 9).

Figs. 14 to 17 give estimated times of the loading part of the cycle in NCB tunnels using various methods of loading with various sizes of tunnels and dirt piles. The figures given, with the exception of the Joy Slusher, may not be valid for tunnels on gradients of more than 1 in 20. In each case the pull has been taken to be ⅞ of the drilled depth. This estimate has been derived from a study of data for about 30 tunnels.

Again it must be remembered that certain loaders can only be used with particular drilling equipments. Hence both must be considered when selecting equipment for maximum drivage rates.

Selection of Loading Equipment

Selection of the loader must allow for the height and width of the tunnel and the drilling equipment used. For high-speed drivage the selection according to capacity of the loader is straightforward and can be based on Figs. 14 to 17.

The use of mine cars and tubs involves the laying of track. Where maximum speeds of advance are necessary some of this work can be done by extra crews, but advancing portable track is essentially face crew work. The times given in Figs. 14 to 17 are, except where stated otherwise, based on the face crew laying track at the face, with extra labour advancing the crossing.

The use of belt conveyors, either only near the face, or for the length of the tunnel, involves extension of the belt. This is normally done by the face crew. For high-speed drivage datal workers must be provided to advance the conveyor tail end

TABLE 8.—*Summary of Average Times Spent during the Complete Loading Cycle Using Eimco Loading Systems in NCB Tunnels.*

Tunnel size.	Tubs.		No. of tubs filled per cycle.	Cub. yd. of solid stone filled per cycle.	Cycle time (min.)	Average times per Eimco spent during the complete loading cycle (min.)																		Miscel-laneous.
	Volume (cub. ft.)	Capa-city (cub. ft. solid stone.)				Prepar-ing to load.	Fill-ing tubs.	Chang-ing tubs.	Wait-ing for other Eimco to finish.	Lay-ing per-manent track.	Advan-cing Eimco port-able track.	Mov-ing Eimco to other track.	Match-ing up pair of Eimcos.	Derail-ments.	Machine break-downs.	Clean-ing points.	Wait-ing for empties	Empty-ing sup-plies.	Await-ing com-pressed air.	Scal-ing.	
One Eimco 21 only.																							
14 ft. by 10 ft.	52.5	24.0	48	42.7	276	2	123	42	—	18	5	3	—	12	2	0	35	3	1	29	1
12 ft. by 9 ft. 6 in.	24.0	11.0	44	17.9	90	5	48	17	—	5	3	—	—	2	0	1	4	3	0	0	2
Two Eimco 21s alternately.																							
14 ft. by 10 ft.	28.0	12.8	61	29.0	142	7	42	24	29	15	5	—	3	5	0	0	0	0	0	10	2
14 ft. by 10 ft. 6 in.	21.0	9.6	70	24.9	114	1	47	17	30	8	3	—	3	0	0	1	1	0	3	0	0
Two Eimco 21s simultaneously.																							
14 ft. by 10 ft.	30.7	14.0	27	14.0	67	5	29	14	—	5	3	—	2	6	1	0	0	0	0	1	1
14 ft. by 10 ft.	25.3	11.6	53	22.8	303	5	57	81	—	8	11	—	17	16	3	0	96	3	0	0	6

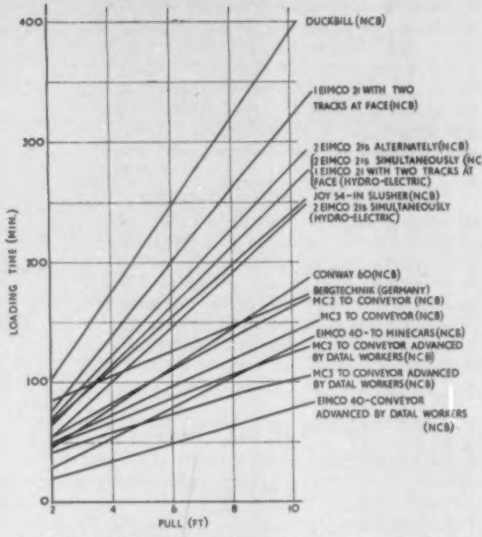
LOADING TIME (MIN.)
PULL (FT)
DUCKBILL (NCB)
1 EIMCO 21 WITH TWO TRACKS AT FACE(NCB)
2 EIMCO 21s ALTERNATELY(NCB)
2 EIMCO 21s SIMULTANEOUSLY (NCB)
1 EIMCO 21 WITH TWO TRACKS AT FACE (HYDRO-ELECTRIC)
JOY 54-IN SLUSHER(NCB)
2 EIMCO 21s SIMULTANEOUSLY (HYDRO-ELECTRIC)
CONWAY 60(NCB)
BERGTECHNIK (GERMANY) MC2 TO CONVEYOR (NCB)
MC3 TO CONVEYOR(NCB)
EIMCO 40 - TO MINECARS(NCB)
MC2 TO CONVEYOR ADVANCED BY DATAL WORKERS(NCB)
MC3 TO CONVEYOR ADVANCED BY DATAL WORKERS(NCB)
EIMCO 40-CONVEYOR ADVANCED BY DATAL WORKERS (NCB)

FIG. 14.—ESTIMATED LOADING TIMES FOR 16-FT. BY 12-FT. TUNNELS.

or, alternatively, a shuttle conveyor is necessary. Belt conveyors give difficulties with spillage, cannot handle large pieces of stone, such as are common in tunnel work, and reflect back delays along their length. Thus, if conveyors are used at the face, some form of bunkerage near to the face which can absorb small intermittent delays will reduce delay times.

The choice between mine cars, tubs, and conveyors depends on the type of loader used and on the drilling equipment. For example, with the MC3, which does not need rails, loading on to a conveyor is preferable providing that the conveyor tail end can be advanced as necessary by an extra crew.

Although it takes longer to change larger tubs

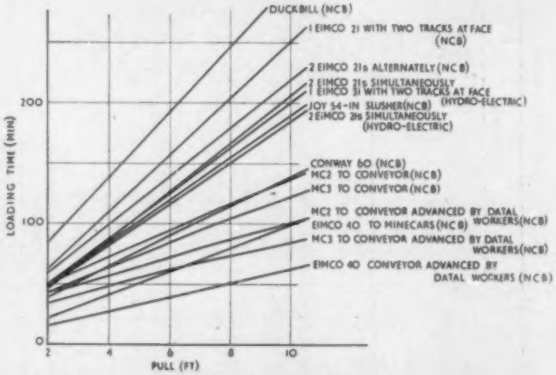
LOADING TIME (MIN)
PULL (FT)
DUCKBILL (NCB)
1 EIMCO 21 WITH TWO TRACKS AT FACE (NCB)
2 EIMCO 21s ALTERNATELY (NCB)
2 EIMCO 21s SIMULTANEOUSLY
1 EIMCO 21 WITH TWO TRACKS AT FACE
JOY 54-IN SLUSHER(NCB) (HYDRO-ELECTRIC)
2 EIMCO 21s SIMULTANEOUSLY (HYDRO-ELECTRIC)
CONWAY 60 (NCB)
MC2 TO CONVEYOR(NCB)
MC3 TO CONVEYOR(NCB)
MC2 TO CONVEYOR ADVANCED BY DATAL WORKERS(NCB)
EIMCO 40 TO MINECARS(NCB)
MC3 TO CONVEYOR ADVANCED BY DATAL WORKERS(NCB)
EIMCO 40 CONVEYOR ADVANCED BY DATAL WORKERS (NCB)

FIG. 15.—ESTIMATED LOADING TIMES FOR 14-FT. BY 10-FT. TUNNELS.

TABLE 9.—*Summary of Average Times Spent during the Complete Loading Cycle—Loaders other than the Eimco 21 in NCB Tunnels.*

Tunnel size.	Equipment. Loading.	Tubs. Volume (cub. ft.).	Tubs. Solid stone capacity (cub. ft.).	No. of tubs filled per cycle.	Cub. yd. of solid stone filled per cycle.	Loading cycle time (min.).	Average times spent during the complete loading cycle (min.). Preparing to load.	Filling tubs.	Changing tubs.	Laying permanent track.	Extending shaker.	Derailments.	Machine breakdowns.	Delays due to large pieces of stone.	Waiting for empties or haulage.	Emptying supplies.	Awaiting compressed air.	Scaling.	Miscellaneous and clearing away.
14 ft. by 10 ft. ..	Eimco 40H to mine cars	105.0	36.0 (60 per cent. filled)	16	21.3	129	0	22	35	5	—	0	9*	0	29	0	0	28	1
14 ft. by 10 ft. ..	Conway 60 to mine cars	126.0	57.6	18	38.4	136	7	65	22	10	—	27	5	0	0	0	0	0	0
12 ft. by 9 ft. 6 in.	20-h.p. type F Duckbill to conveyor to tubs	37.5	17.1	34	21.5	125	0	90	0	—	14	0	4	13	0	0	0	0	4
14 ft. by 10 ft. ..	Duckbill to tubs ..	28.9	13.2	58	28.4	212	0	162	0	—	35	0	0	7	2	3	0	0	3
15 ft. by 11 ft. ..	40-h.p. Joy Sullivan 54-in. Slusher to end-tip cars	125.0	57.2	22	46.6	330	0	70	237	—	—	0	5	2	0	15	—	0	1
14 ft. by 10 ft. ..	MC2/1A Samson loader to conveyor to tubs	27.0	12.3	18½	8.4	88	0	49	0	—	—	0	0	7	8	0	—	23	1
15 ft. by 10 ft. 6 in.	MC2 Samson loader to conveyor to mine cars	61.0	16.7 (60 per cent. filled)	18	11.1	47	0	37	10	—	—	0	0	0	0	0	—	0	0
16 ft. to 17 ft. by 11 ft. 6 in.	MC3 to tubs ..	51.2	23.4	55	47.6	164	3	68	48	20	—	0	1	1	18	—	0	1	4
13 ft. to 14 ft. by 10 ft.	MC3 to conveyor to mine cars	—	—	—	22.0	85	2	40	—	—	14‡	0	10	1	15	—	0	0	3
18 ft. by 12 ft. ..	MC3 to conveyors to staple shaft	—	—	—	30.5	95	2	46	—	—	40	0	2	5	0	—	0	0	0
15 ft. by 11 ft. ..	MC3 to conveyors to staple shaft	—	—	—	24.9	105	4	48§	—	—	40	0	1	1	8	—	0	0	3
10 ft. by 8 ft. ..	MC3 to conveyor to pit conveyor system	—	—	—	19.9	285	0	41	—	—	87†	0	4	29	112**	—	0	7	5

* This delay was entirely due to a fault in the conveyor drive. The shovelling action of the Eimco 40H was frequently stopped to allow the belt to clear the stone away when the load became too great.

† This tunnel was on a gradient of 1 in 7 rise, hence advancing the tail end was difficult.

‡ The conveyor was advanced 9 ft. during drilling by two of the crew of six. It took 76 min., or the equivalent of 25 min. complete delay to drilling, *i.e.*, 14 min. per loading cycle (advance 5 ft.).

§ The conveyor tail end was too far from the face to allow the MC3 to load all of the pile directly on to the belt. This filling time includes 4 min. loading dirt which had already been thrown back by the loader nearer to the conveyor.

** Although this delay prevented work in the tunnel, the men were able to work on other jobs elsewhere during this time.

or mine cars, the time does not increase proportionately with the volume. With Eimco loading, changing time is approximately 1 sec./cub. ft. capacity. With small tubs of 25 cub. ft. capacity, the figure is nearer 1.5 sec./cub. ft.

For efficient tub changing large tubs should be used provided that filling rate is not impaired.

Organization of the Work

Sufficient empties should always be available to prevent delays to the loader. Where the main pit haulage is such that full tubs from the tunnel may not be returned empty to the tunnel in ample time for use, it may be necessary to keep a sufficient supply of empties in the tunnel to take a full round of dirt. Alternatively, the use of a bunker or a shuttle train can be considered. The loading times given do not include an allowance for waiting for empties.

With loaders loading direct into tubs or mine cars, the tub-changing time usually occupies 15-25 per cent. of the total loading cycle time. It is thus imperative that the tub-changing time should be cut to a minimum by using the most efficient method for the particular conditions.

Comparison with times given in Tables 8 and 9 will show how efficiently a particular method of tub changing is being used.

With gathering-arm type loaders loading directly on to a belt conveyor, the belt conveyor is normally advanced by the face crew. Similarly with loaders delivering into mine cars or tubs, the advancing of the track is also normally

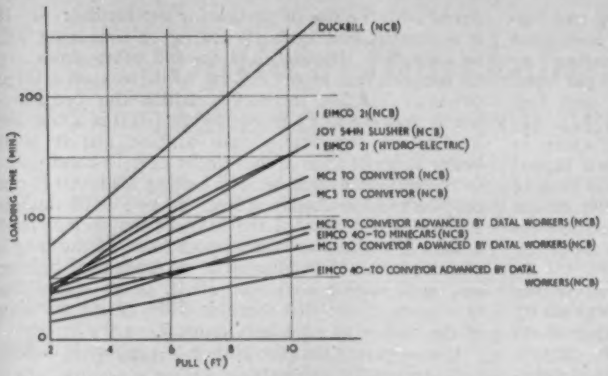

FIG. 16.—ESTIMATED LOADING TIMES FOR 12-FT. BY 9-FT. TUNNELS.

done by the face crews. It is recommended that, wherever practicable, these operations, which delay the tunnelling cycle, should be done by datal workers, to allow the face crew to proceed with other work.

In tunnels where a special crew for this purpose is not possible, every effort should be made to cut these times of advancing the haulage to a minimum. Similarly, with Duckbill-type loaders, the time of loading is greatly affected by the time to insert or remove a pan, an operation which is necessary every loading cycle. Every effort should be made to minimize this time. If a belt conveyor is used behind the Duckbill loader, advancing the tail end should preferably be done by a special crew, during the other parts of the cycle.

The times given in Figs. 14 to 17 do not allow for special crews to advance haulage at the face, except where stated.

The preparation time after returning to the face following firing should be as short as possible. This can partly be achieved by doing some of the preparation work during the charging and stemming. Thus, drilling equipment should be moved out of the way, the loader should be moved as near to the face as safety will allow, and all available empties should be ready for the loading part of the cycle.

When the men return to the face they should only do as much scaling and supporting as is necessary to comply with the regulations and for the safety of the loader operator. Any other scaling and supporting should be done either while the loader is working or during the main supporting work.

As with drilling, maximum loading rates can only be achieved with high pressure of compressed air. The figures for NCB tunnels given in Figs. 14 to 17 have been based on the average pressure of about 75 lb./sq. in. in the NCB tunnels studied. These times can be reduced by using higher pressures. At least 90 lb./sq. in. (with ample capacity) should be available.

In high-speed drivage the number of delays due to machine breakdowns and the delay times involved must be kept to a minimum. Loaders must be serviced regularly and scheduled replacement of worn parts is strongly recommended. Spare parts should be within easy reach of the tunnel face. The fitter should be quickly available for breakdowns and the face crew should be able to help him.

When two Eimco 21s are used in a tunnel, faster loading can be attained by filling simultaneously rather than alternately. To do this the controls on one of the Eimcos need to be on the right-hand side as compared to the normal left-hand side. Both types are now being made by the manufacturers, but older models are easily adaptable.

METHODS OF SUPPORT

In all the NCB tunnels visited for time studies, two-piece arches were set at 2-ft. to 4-ft. centres. The methods of tying the arches together and the amount of strutting and lagging varied considerably. In most tunnels, one or two arches were set per cycle according to the length of unsupported roof before the previous firing. In one tunnel three arches were set in some cycles.

In only one of the hydro-electric tunnels was arch setting observed. These arches were two-piece and of light section, each piece constructed of a straight length and curved length of I-section girder welded together. Even in this tunnel supporting was only necessary for a short distance. In the other hydro-electric tunnels visited no supporting was necessary except at the portal.

In the German tunnel, to make use of the dirt pile and to avoid the need for temporary forepoling, four or five three-piece arches were erected per cycle, the centre sections being erected and lagged in their permanent position before loading started. After loading the dirt, the legs were put in position and the remaining strutting and lagging completed.

In the NCB tunnels arch setting took 25 to 80 min. per completed arch and 41 to 160 min. per cycle according to the size of crew, number and

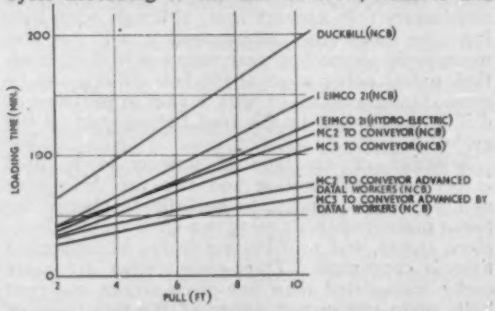

FIG. 17.—ESTIMATED LOADING TIMES FOR 10-FT. BY 8-FT. TUNNELS.

weight of arches set, and type of strutting and lagging necessary. These times were composed approximately of:—25 per cent. bringing up materials and preparing to set arches; 30 per cent. setting and tying the arches; and 45 per cent. lagging and packing dirt behind the arches.

Where more than one arch was set per cycle, in some tunnels each arch was set and then lagged before starting the next. In other tunnels lagging of the two arches was done after both the arches had been tied in position. This latter method reduced the total arch setting time by about 20 per cent.

In the hydro-electric tunnel where arch setting was observed, one 7-ft. by 5-ft. 6-in. arch was set by the crew of seven men in 69 min. against an average of 51 min. per arch in NCB tunnels with heavier arches and smaller crews. It is probable that lack of practice, due to the rare need for arch setting, caused the time to be higher than in NCB tunnels.

In the German tunnel, arch setting took 184 min. per cycle or 42 min. per arch. In this case the three-piece arches were 15 ft. 9 in. by 13 ft. 3 in. and thus, in total weight per arch, heavier than most arches usually used in NCB tunnels. This work was mostly done by six men. Analysis of the number of men employed and the time taken shows these times to be similar to those for two-piece arches in NCB tunnels.

No time studies of roof bolting in tunnel drivage were made. Two tunnels where roof bolting had been used were, however, visited and the advantages and disadvantages discussed with the management and face crews. Table 10 gives the estimated times per cycle of supporting various size tunnels using two- and three-piece arches.

Times for Roof Bolting

No times have been given for roof bolting since no reliable time studies are available. In a tunnel in sandy shale, where five 4-ft. 6-in. bolts per yd. of advance are needed to support the roof, a crew of four using two drills can erect one set of bolts with wire mesh in about 1 hr. In sandstone the time is more than this, while in softer strata the work can be done more quickly. In mudstone, wet shale, broken ground, etc., roof bolting is not satisfactory. It appears that, although roof bolting may have other advantages, it will not give more rapid supporting than conventional arch setting, unless either some of the hole drilling can be done during loading or with higher application of drilling equipment to the roof bolting part of the cycle.

Selection of the type of support to be used is between roof bolting and two- or three-piece arches. There appears to be little to choose between present methods using two-piece arches, three-piece arches, and roof bolting so far as supporting time is concerned. Three-piece arches are more easily transported than two-piece arches and roof bolts more easily than either of the two types of arches.

Roof bolting has the following advantages compared with the use of arches for supporting:—(*i*) If it is certain that no arch setting or timbering will be necessary, drilling, loading, and other times can be reduced due to not having to drive such a large roadway (arches normally reduce the cross-sectional area by 10 to 15 per cent.); (*ii*) it is a cheaper method of supporting than arches; (*iii*) it gives better support than arches under certain conditions.

The disadvantages of roof bolting are:—(*i*) It can only be used in certain strata. In two NCB tunnels visited 70 per cent. of the tunnel's length was roof bolted; (*ii*) where arches support some of the length of the tunnel it is advisable to do both roof bolting and arch setting for some 30 ft. or so where the two types meet; (*iii*) there is little or no warning of the failure of roof bolt support.

It is apparent that the choice of support is dependent on local conditions.

Organization of the Work

The face crew should only do such support work as is necessary to comply with the regulations and to ensure their safety in the following face operation (*e.g.*, lagging of the lower halves of the arch spaces can frequently be left to other workers).

The times given in Table 10 are for the average amount of lagging normally done by the face crew in NCB tunnels (*i.e.*, complete lagging over the crown with some lagging at the sides).

TABLE 10.—*Estimated Arch Setting Times (including Boarding and Lagging).*

Size of crew.	Time per arch (min.) using two piece arches.		
	16-ft. by 12-ft. and 14-ft. by 10-ft. arches.	12-ft. by 9-ft. arches.	10-ft. by 8-ft. arches.
2		75	50
3	70 (14-ft. arches only)	50	33
4	52	38	25
5	42	30	20
6	35	25	—
7	30	21	—
	—	—	—
	Time per arch (min.) using three-piece arches as in Germany.		
6	41		

There are many types of lagging, strutting, and tying materials in use in NCB tunnels. Much time is frequently spent in cutting timber for lagging boards, footblocks, etc., and in many cases the size required is known and the materials could be prepared at the pit top. All materials should, as far as possible, be sent to the tunnel made to a size suitable for use. The preparation time should be kept to a minimum. Thus, during loading some of the crew should be bringing supporting materials to within easy reach of the face. Soon after loading is complete, the first of these materials should be on the way to the face.

When a number of arches are being set per cycle, it may be possible to set all the arches before starting lagging. This reduces the total time taken compared to completion of arches and their lagging one at a time. All tools necessary for rapid setting and lagging should be to hand at the face.

India's Rourkela Steelworks

LARGE CONTRACTS FOR GERMAN CONCERNS

India's second Five-year Plan (1956-61) *aimed at stepping up steel production to* 6,000,000 *ingot tons annually. This was to be brought about by increasing the output capacity of older steel plants to* 3,000,000 *tons a year and constructing three new integrated steelworks, each with an annual production of* 1,000,000 *ingot tons. Rourkela, in the State of Orissa, was selected as the site of the first steelworks in the public sector. It is one of the largest foreign contracts ever received by the German heavy industry.*

THIRTY-FIVE major German concerns received main contracts from the Indian Republic for the Rourkela works and 3,000 more featured as sub-contractors. The key firms were Krupp and Demag. The f.o.b. value of equipment supplied was of the order of DM 85,000,000. To this should be added the erection and assembly costs of around DM 110,000,000. The aggregate outlay is reckoned at DM 1,500,000,000. For financing the Rourkela steelworks alone the West German Government negotiated a DM 660,000,000 three-year credit.

The iron ore for the plant is obtained some 50 miles from the site in the Bonai district, lime and dolomite coming from adjacent locations. Water supplies are derived from the Brahmani river.

The requisite coking coal has, however, had to be transported some 186 miles. Rourkela is on the main Calcutta-Bombay railway line. While the steelworks embraces an area of nearly 2 sq. miles and lies on the plain about 770 ft. above sea level with a slope towards the Brahmani river, the new Rourkela town is separated from it by a ridge of hills, parallel to which runs the railway. The town is, therefore, spared the dust, noise, and nuisance of the steelworks.

Departmental Scope of the Works

There are numerous sections attached to this integrated steelworks, including coke ovens and by-product plant, blast furnaces, blast-furnace gas-cleaning plant, steam-operated power station, pig-casting machine, steel-melting shop, ingot stripping bay, and rolling mills. A lime and dolomite calcining plant is provided, with dolomite brick-works: also an oxygen plant, general maintenance workshops, grey-iron foundry, together with central offices and ancillary buildings.

Nearly 360,000 tons of plant and equipment have had to be sent to the plant site from western Germany. Of this, 350,000 tons reached India by the autumn of 1959. The problem of transport varied with the particular requirements of each consignment. The moving of over-sized equipment was solved by the provision of special type wagons. By and large, two block trains left for Rourkela alone every day for several months during 1958 for the works to progress according to schedule.

The iron ores for the blast furnaces assay over 60 per cent. iron content and are low both in sulphur and phosphorus. They are quarried at Barsua in Kurhadi valley and are classified and transported by a specially built railway. The ore is won by scraper and carried by belt to the screening plant. The coking coal is obtained from the Kargali, Bokaro, and Jharia coalfields. The coking plant consists of six batteries, each of 35 ovens, and is designed for a throughput of 1,640,000 tons a year. There is also a 1,765,000 cub. ft. gasholder.

The first and second coke-oven batteries were lit in September, 1958, and the first coke was produced on December 3 of the same year. Installations for the treatment of coke-oven gas for a daily production of nearly 60,000,000 cub. ft. comprise these groups:—Tar extraction plant; heavy water plant for 15 per cent. ammonia; sulphuric acid plant, and benzole distillation unit, as well as secondary equipment for the output of commercial items, or such products as may be utilized by the steelworks.

Blast Furnaces and Steel Plant

Rourkela has three blast furnaces, each with a daily output of 1,000 tons, and possessing a group of three hot-blast stoves of 26 ft. 3 in. dia. and a heating surface of about 366,000 sq. ft. The gas-cleaning plant has six washers and a similar number of electrostatic precipitators and water-cleaning and circulation system. The gas has a maximum temperature of 300 deg. C. and, when cleaned, a maximum dust content of 0.0044 grn./cub. ft. (NTP).

This steelworks' power station has a capacity of 75 MW, accounted for by three turbo-generators of 25 MW each. The total energy needs amount to 125 MW and the deficit is met by the Hirakud hydro-electric power station. The steel produced is 75 per cent. by oxygen-blown converter employing the LD technique, the balance being open-hearth steel.

Each of the three converters has a capacity of 40 tons. Two mixers, each of 1,100 tons, receive the molten pig-iron from the blast furnaces. It is the first time that the LD process has been employed in India.

The first Rourkela open-hearth furnace was commissioned in April, 1959. The oxygen plant consists of three units, each with a throughput of

116,500 cub. ft./hr. (NTP). Altogether, this liquid-air plant produces about 350,000 cub. ft./hr. of oxygen 99.5 per cent. pure; nearly 230,000 cub. ft. of nitrogen 99.9 per cent. pure, and 392,000 cub. ft. of nitrogen 90 per cent. pure.

The entire steel melting shop at Rourkela was built by a consortium of German companies, which used some 45,000 tons of steel.

The soaking pits comprise seven units, each with two furnaces, coke-oven or mixed gas being employed for heating. The pits have a throughput of 1,000,000 tons a year of 300 working days. Slabs coming from the blooming mill through the scarfing shop, or from the stores, are heated in a pusher-type furnace. The finishing end of the plate mill has a continuous normalizing furnace.

The cold-rolling mill has two reversing and two skin-pass stands of 5 ft. 7 in. and 4 ft. barrel length, respectively, for rolling sheet for motor-car bodies and for tinplate. There is a large continuous pickling line. The finished sheet is normalized in a hood-type annealing furnace and thence split to size. The 1,000,000 tons of ingot slabs are rolled to 720,000 tons of finished products, comprising 200,000 tons of heavy plate, 300,000 tons of medium and wide strip in coils, 170,000 tons of sheet in coils, and 50,000 tons of tinplate produced by the hot-dip process.

Inasmuch as the quality of the water supply from the Brahmani river fails to meet the requirements of the steel plant, a clarifying and cooling system was installed by a group of German hydraulic engineering firms. The dirty water is returned to the river via a purifying and cooling plant. To ensure supplies throughout the year one of the Brahmani's tributaries—the Sankh—was dammed at its upper reaches. In the Brahmani river itself only a sill was constructed from which water is led through an intake pumping station and clarifying system to the distribution network.

Instrument-control Station

The Rourkela steelworks' operations are co-ordinated by a key instrument-control station, which receives and evaluates remote transmitted data from the entire installation. All the necessary equipment for this, including a control centre for the works system and a major part of the extensive instrument and other operational controls of the various individual units, was supplied by Siemens & Halske.

This Rourkela enterprise has naturally brought other industries in its train, including a fertilizer plant accounting for 600,000 tons a year of calcium ammonium nitrate, and a pipe-making plant with an annual capacity of 100,000 tons of 8-in. to 20-in. pipe.

Six years ago the training of Indian engineers and skilled foremen was taken in hand by Krupp-Demag. In such programmes lasting a year or more both younger and experienced Indian engineers have been made familiar in West Germany with the latest works' methods. For the Rourkela plant alone about 300 Indian engineers are being so trained. To construct the steelworks it was necessary for hundreds of German engineers and erectors to work for some years in a confined area where before there was nothing but scrub jungle. Today, there is an industrial complex, and separated from it by a line of hills is a modern residential city where Indians and Germans live side by side. This new town is about four miles from the steelworks. Here, five different types of detached dwellings with garden, a total of 7,500 units, are being built. By the end of 1959 some 4,000 houses had been completed. In addition, there are the usual modern amenities—a club house, a hospital, and recreational and cultural facilities.

According to the latest revised schedule of work on the steel plants, Rourkela is expected to be completed by April, 1961. The plate, strip, and cold-rolling mills should be coming into operation during 1960 and 1961.

LANDMARK IN SHOTFIRING PRACTICE

HISTORY in shotfiring practice has been made in the East Midlands Division of the National Coal Board. The board announces that it has placed orders for 22,000,000 plastic water bags, worth £165,000, to be delivered during the next 12 months. For many years it has been the practice to stem with wet clay the boreholes into which explosive charges are inserted during blasting operations. Mr. William Wood, safety engineer of the East Midlands Divisional Coal Board, saw the possibilities of employing a long plastic tube of water behind the charge instead of clay. His concern was primarily from the safety angle—to cut out the risk of combustion from the point of explosion and reduce dust and fumes.

Experience has shown that his expectations were justified. Not only does the use of water near the charge cut out the combustion risk, it has also practically eliminated lingering dust and fumes, thus considerably reducing time lost previously through men having to wait to allow dust and fumes to clear. The use of water-filled stemming bags also reduces the shatter effect on coal, and this is helping the board's drive to increase the amount of large coal mined.

The latest water bags are self-sealing. They are carried empty into the mines by the shotfirers and are filled as necessary from the water supply pipes, which are now a normal feature underground. The use of plastic water tubes has already spread to other coalfields and is being taken up by the European coal industries. Commercial trials are taking place in Australia, New Zealand, and South Africa.

Brodsworth Main Reconstruction

Work on the reconstruction scheme at Brodsworth Main Colliery (Yorks), described in an article on p. 709 of our last issue, is still very much in progress. It will be many months before the reconstruction scheme reaches the point envisaged in the article. The use of the past tense was, therefore, somewhat premature. A completely new guide tower consisting of four main columns braced to form the tower is being supplied, but it has now been decided not to fit hydro-pneumatic buffers in this connection.

Company News

ICI's RECORD PROFITS

Group Sales Now Over £500,000,000

RECORD profits and an increased dividend are announced by Imperial Chemical Industries, Limited. The group's sales rose last year from £463,000,000 to £509,000,000 and group income, before tax, was up to the record figure of £73,100,000 (£44,500,000). A final dividend of 7½ per cent., against 5 per cent. a year ago, brings the payment for the year to 11¼ per cent., compared with 8 per cent. Under the company's profit-sharing plan £7,100,157 (£5,406,177) is set aside as employees' profit-sharing bonus.

Group sales at mid-year were 7½ per cent. up and the final figures now show that the rise was considerably greater in the second half of the year to give a final rate of increase of 10 per cent. for the whole year. Group income is nearly 75 per cent. up, and there is a rise of 93 per cent. from £17,600,000 to £33,900,000 in the net income of the parent company.

After allowing for a much heavier tax charge of £31,500,000 (£20,700,000), group income jumped to £41,600,000 (£23,800,000). The higher dividend is again consistent with conservative distribution policy and there are the usual massive appropriations to reserves. The f.o.b. value of exports from the UK was £87,500,000 last year, compared with £73,800,000 in 1958.

NATAL AMMONIUM COLLIERIES, LIMITED—The interim dividend is 1s. (1s. 3d.) per 5s. share.

RHEOSTATIC COMPANY, LIMITED—A one-for-three scrip issue of new 4s. ordinary shares is to be made.

F. PERKINS, LIMITED, diesel engine manufacturers of Peterborough—An interim dividend of £745,865 tax free is announced.

DARLINGTON WIRE MILLS, LIMITED—Group net profit for 1959 was £33,449 (£22,435) and the dividend is 9d. (7½d.) per 5s. share.

STANDARD BRASS IRON & STEEL FOUNDRIES, LIMITED—There is no interim dividend for the year to June 30, 1960 (6d. per 5s. share).

AUSTRALIAN ALUMINIUM COMPANY, LIMITED—Profits rose to £A468,000 (£A412,000) in 1959, and the ordinary dividend is doubled at 20 per cent.

J. & J. DYSON, LIMITED, manufacturers of refractory materials, etc., of Sheffield—All the ordinary capital of D. Duddell, Limited, Stoke-on-Trent, has been acquired.

ALEXANDER DUCKHAM & COMPANY, LIMITED—Net profits for 1959 were £91,456 (£72,475) and the dividend is 17½ (15) per cent. on a capital doubled by a scrip issue.

G. & J. WEIR HOLDINGS, LIMITED—Group net profits rose from £1,123,173 to £1,256,143 in 1959 and the dividend is raised to 18 (17) per cent., with a final of 12 per cent.

LANARKSHIRE BOLT (HOLDINGS), LIMITED—Group net profit for 1959 was £40,172 (£36,714), after tax of £33,978 (£38,569). Placed to ordinary dividend is £25,000 (nil).

BOWTHORPE HOLDINGS, LIMITED—A subsidiary—Bowthorpe (NZ), Limited—has been formed in Christchurch, New Zealand, to make and distribute fittings and accessories for overhead power transmission lines previously exported from the UK by the Bowthorpe Electrical Company, Limited.

FRANCIS MORTON & COMPANY, LIMITED, makers of structural steelwork, etc., of Liverpool—At an extraordinary general meeting on Monday it was resolved to voluntarily wind up the company.

CHARLES WADE & COMPANY, LIMITED, iron and steel stockholders, etc., of Birmingham—Net profit for 1959 was £30,525 (£21,138), after tax of £28,819 (£32,008). The dividend is 12½ (10) per cent., tax free.

HALL ENGINEERING (HOLDINGS), LIMITED—The final dividend is raised to 8½ (6) per cent. to make 12½ (10) per cent. for 1959. Group profits expanded from £608,233 to £874,996 and after tax the net balance is £505,055 (£306,944).

FRANCIS SHAW & COMPANY, LIMITED, manufacturers of rubber, hydraulic, and plastics machinery of Manchester—The company has acquired substantially all the capital of Jos. Robinson & Company, Limited, of Salford (Lancs), which has similar interests.

RUBEROID, LIMITED—With a final payment of 11 per cent., the ordinary dividend is raised to 16 per cent. from the equivalent of 14½ per cent. for 1958 allowing for the two-for-five scrip issue. Group net profits were £165,083 (£162,935), after tax of £85,782 (£168,007).

SETTLE SPEAKMAN & COMPANY, LIMITED, coal factors and shippers, of Stoke-on-Trent—Group net profits rose from £23,286 to £51,676 in 1959 and the dividend is 12½ (10) per cent. Shareholders also received a special capital dividend of 7s. per £1 unit, tax free, in the latter part of 1959.

BRITISH ROLLMAKERS CORPORATION, LIMITED—The final dividend is 8 per cent., making 12 per cent. for the year to January 2, 1960, or the same equivalent as previously, adjusting for last May's one-for-four scrip issue. The net group profit is £429,836 (£467,016), after tax of £359,062 (£505,860).

JOHN CASHMORE, LIMITED, machine-tool merchants, etc., of Tipton (Staffs)—Dividend of 17½ per cent. is announced for the year ended January 31, 1960, against 15 per cent. forecast when the shares were offered for sale last April. After tax of £200,110 (£121,000) the net profit is £188,959 (£107,647).

GLYNWED TUBES, LIMITED—Group net profits for 1959 are £644,594 (£450,344) after tax of £586,907 (£526,881). An increase of 5 per cent. to 25 per cent. in the total dividend on the £1,750,000 capital, and a three-for-seven scrip issue are announced. Following the higher 12 (10) per cent. interim, the final dividend is

raised to 13 (10) per cent. Nominal capital is to be increased by £1,000,000 to £3,000,000 and the proposed scrip issue will bring the issued amount up to £2,500,000.

JAMES PICKUP & COMPANY (TEXTILE MACHINERY), LIMITED—An offer of 1s. 9d. for the 1,920,000 2s. units of the Eclipse Mill Company, Limited, has been made. The deal is worth £168,000. The Eclipse Company directors recommend acceptance of the offer, which is subject to 90 per cent. acceptance.

JOHN WALLACE & SONS, LIMITED, agricultural engineers, implement makers, etc., of Glasgow—It is proposed to increase the capital from £100,000 to £800,000 in order to extend the business by acquiring certain companies carrying on similar or ancillary activities, and to make a 10 per cent. scrip issue.

CROFTS ENGINEERS (HOLDINGS), LIMITED, iron and steel and brassfounders, etc., of Bradford—Final dividend of 9¼ per cent. is being paid, making 16 per cent. for 1959, on capital increased by a one-for-four scrip issue—an effective increase of 2 per cent. After tax of £623,591 (£671,785), group net profit rose to £673,794 (£618,771).

BIFURCATED & TUBULAR RIVET COMPANY, LIMITED—Final dividend is raised from 11 per cent. to 15 per cent., tax free, for 1959, making, with the increased interim, a total of 20 per cent., tax free, against 15 per cent. Profit was £427,730 (£342,961), and after tax of £197,250 (£176,400), net balance increased from £166,561 to £230,480.

MILES DRUCE & COMPANY, LIMITED, iron and steel stockholders, of London, W.3.—Dividend for 1959 is effectively raised by 3¼ per cent. to 16¾ per cent., with a final of 10 per cent. on the capital as increased by a 50 per cent. scrip issue. Group profit recovered from £165,966 to £206,464, and after tax of £93,080 (£82,402), net profit is £113,384 (£83,564).

H. BRAMMER & COMPANY, LIMITED, manufacturers of transmission belting, etc., of Leeds—The dividend is raised from the equivalent of 23¼ per cent. to 25 per cent., on capital increased by a one-for-two scrip issue, with a final of 17½ per cent. for 1959. Group profits were £249,039 (£193,914) and the net balance is £136,383 (£86,801), after tax of £112,656 (£107,113).

GARDINER SONS & COMPANY, LIMITED, milling and general engineers, etc., of Bristol—The company incurred a group net loss of £34,284 in 1959, compared with a previous profit of £3,813. A final dividend of 3 per cent. makes 5 per cent. for the year. Previously, in addition to a dividend of 6¼ per cent. there was a tax free distribution of 1¼ per cent.

BIRMINGHAM RAILWAY CARRIAGE & WAGON COMPANY, LIMITED—The board, which recently received a merger offer from Charles Roberts & Company, Limited, Wakefield, reports lower earnings for 1959. The dividend is cut to 7½ (10) per cent., but is supplemented by a tax-free payment of 5 per cent. from capital profits. Net profit was £71,508 (£95,836), after tax of £69,042 (£79,042).

H. & J. HILL (WILLENHALL), LIMITED—In view of a heavier order book for forgings, the board is embarking on a fairly substantial capital expenditure in this field to cope with increased demand and to enable the group to compete more easily with present day prices. Group profit for 1959 is £8,313 (£11,126), after tax of £6,681 (£11,521). The dividend is held at 22½ per cent.

HENRY BALFOUR & COMPANY, LIMITED, ironfounders, gas and chemical engineers, etc., of Leven (Fife)—The dividend is raised by 1 per cent. to 18 per cent. for the year ended October 31, 1959. Recent months have shown a marked increase in the number of orders received from both oversea and home sources, states the chairman, Mr. W. Lindsay Burns. Group net profit increased to £92,124 (£75,013).

HARRISON (BIRMINGHAM), LIMITED—The dividend for the year ended December 31, 1959, is held at 9d., but the bonus is doubled at 3d. Profit, after tax, rose to £180,650 (£123,321). Increase of the authorized capital to £1,150,000 and the capitalization of £396,000 by the distribution of 1,584,000 ordinary 5s. shares as a bonus issue to holders will be proposed at an extraordinary meeting following the annual meeting on May 6.

NORTH BRITISH LOCOMOTIVE COMPANY, LIMITED—The chairman, Mr. T. Coughtrie, reports that orders at December 31, 1959, were just over £11,000,000. Export orders were particularly difficult. Everything possible was being done to revitalize the selling effort at home and oversea. The group incurred a loss of £1,349,566 in 1959, against a net loss of £909,512. The net loss attributable to the parent company was £1,319,541 (£911,827).

C. A. PARSONS & COMPANY, LIMITED, makers of steam turbines and electrical machinery, etc., of Newcastle-upon-Tyne—With a final of 5 per cent., the dividend is effectively raised by 1¼ per cent. to 9¼ per cent. The final a year ago of 3¾ per cent. was accompanied by a special interim of ¼ per cent. After tax of £1,269,575 (£1,240,454), and debiting £170,000 (£50,000) to contingencies reserve, net profit was £2,209,114 (£2,091,284).

TUBE INVESTMENTS, LIMITED—Approximately 99 per cent. of the 16,828,702 ordinary £1 shares provisionally allotted to ordinary holders at 25s. per share have been taken up. The issue was not underwritten, but Helbert Wagg & Company, Limited, and J. Henry Schroder & Company, Limited, have subscribed at the issue price for the shares not taken up. These shares will be sold and the net proceeds will be distributed among the holders whose rights were not taken up.

CLARKE, CHAPMAN & COMPANY, LIMITED, marine and electrical engineers, boilermakers, etc., of Gateshead—Depression of freights and the nervousness in laying down of new tonnage had resulted in a lack of orders for the company's marine equipment, said the chairman, Mr. J. B. Woodeson, at the annual meeting. In addition, the company was feeling the effect of economies exercized by the National Coal Board. He spoke of the difficulties concerning power station plant which, due to modern designs, have resulted in larger units and in turn fewer orders being placed with those concerned with power station equipment. The total result of these factors was that there would be a slight contraction in the turnover this year which, if matters worsen, could affect the company's results.

Swan, Hunter Group Leads Foreign Competitors

POST-WAR modernization of Tyneside and Clydeside shipyards and engineering works of Swan, Hunter, & Wigham Richardson, Limited, had cost £13,000,000, said the chairman, Mr. E. J. Hunter, after the launch from the firm's Wallsend shipyard of the 13,000 gross ton cargo liner, Port New Plymouth.

He added: "We are employing all the latest techniques and are constantly improving on them, and do not accept that we are in any way behind our foreign competitors. In fact in some respects we are now ahead, and this is not untrue of other yards in the country."

IRON AND STEEL TRADE

BRITISH steel crosses the threshold of the second quarter of the year with a magnificent record of achievement in the past three months and mounting confidence in a further rise in its prosperity. Of this the best assurance is the relatively low level of British prices. There have been three successive cuts in British maximum home prices in the past two years. The bulk buying to which home consumers have reverted has a sound economic basis and cheap steel is helping the engineering industry to maintain and expand its foreign trade.

Pig-iron

The ironfoundries are making slow progress and their pig-iron requirements are amply covered, but the substantial rise in basic iron production is not keeping pace with the needs of the open-hearth furnaces. This is clearly indicated by the steady erosion of reserve stocks at the steelworks, and although scrap consumption has also increased, the main burden of sustaining the rise in steel production must fall upon the further expansion of supplies of basic pig-iron.

This is now clearly envisaged and steps are in hand to bring pig-iron production into closer uniformity with current consumption.

Ferro-alloys

In general the conditions of the market show little change, a good demand for most items being maintained. Ferro-tungsten is unchanged in price and continues to attract steady attention. Ferro-silicon is quite active, while silicon metal continues to be of slightly more interest.

Both the high and low carbon grades of ferro-chrome are receiving moderate support and there is a fair demand for ferro-manganese and silico-manganese. The call on ferro-sulphide and ferro-phosphorus by certain consumers is at a good level. Ferro-vanadium and ferro-molybdenum are in moderate request and there is a good demand for ferro-titanium and ferro-niobium.

Semi-finished Steel

Larger tonnages of steel semis of foreign manufacture are required to meet what are believed to be temporary shortages in home supplies. But exports of higher priced finished steel products show a similar resilience and as more capacity will soon be available the intake of foreign semis on the present scale may be of brief duration.

Production of slabs for the sheet mills is more in balance, but bigger tonnages of billets and blooms are required by the re-rollers.

Finished Steel

Demand for nearly all types of finished steel products except rails is heavy, but not oppressive. Capacity of the rolling mills is fully engaged, but the industry is dealing successfully with greatly increased requirements.

The call for heavy structural steels is quite outstanding, industrial re-equipment assuming exceptionally large proportions. Further seasonal expansion is reflected in the spate of specifications for joists and heavy sections.

The plate mills too have been restored to full production and re-rollers of small bars and light sections have all the orders with which they can cope.

Mr. FRED HALL, works and general manager of the Superheater Company, Limited, of Manchester, for the past 28 years has retired.

Ore Chartering

BUSINESS concluded from the Mediterranean area has been mostly miscellaneous, but there is no particular volume of inquiry from the north African coast to the Continent, and the market is steady with no pressure. Melilla/Ymuiden or Amsterdam paid 18s. 6d. on gross terms for 9,000 tons, April, and some chartering has been arranged with burnt ore on the basis of Porto Marghera/Rotterdam 3,900 tons, April, at 29s. 6d., and Barcelona-Malaga range to Lubeck for April/May, at 26s. 6d. f.i.o. for about 4,200 tons. North Spain reports Corunna/Rotterdam at 19s. 6d. for a 4,100 tonner and there is further inquiry for continental discharge from the north Spanish coast. Malmo/Gdynia or Gdansk reports 11s. 6d. f.i.o. for 10,500 tons, concentrates, for prompt April loading, but the whole Swedish market is meanwhile quiet with nothing definite quoting on the open market to this side.

Manganese has been fixed from Poti to Irlam at 37s. 6d. for about 9,500 tons, April 11 to 25, and from West Africa chrome ore from Freetown to Immingham paid 52s. on gross terms for about 7,900 tons, April. Pepel/Bordeaux reports a 10,000 tonner for middle April at 30s.

There is some inquiry for tonnage to load phosphate from Casablanca and 3,300 tons has been fixed from this loading port to Hull for April at 36s. 6d. and 10,000 tons to Holland for middle April at 20s. Two 9,500 tonners have been fixed from Sfax to Holland for April at 21s.

Morphou Bay pyrites to Immingham arranged 9,500 tons for middle April at 38s. 6d. and from Huelva 1,750 tons to Dublin at 37s. 6d., 3,000 tons to Belfast at 39s., and 4,000 tons to Rotterdam at 24s., all for April loading.

Port Pirie/Bristol Channel-Havre-Hamburg range has paid 92s. 6d. for 8,000 tons of concentrates, option Antwerp at 90s., or two ports Bristol Channel at 94s. 6d., for June 15 to July 15.

Stanton Ironworks Long-service Presentations

GOLD watches were presented to 93 male employees with over 30 years' service and to two female employees with 25 years' service by Mr. N. C. Macdiarmid, managing director of the Stanton Ironworks Company, Limited, Nottingham, last Friday. Since the first such presentation was held in 1952, 2,029 gold watches have been presented.

Mr. A. Savage, an overhead electric crane driver, received the two-thousandth watch, and of the recipients at the last presentation 69 are employed at the Stanton Works, 21 at the Holwell Works at Melton Mowbray, and three at Cochranes Works, Middlesbrough.

Coalfield News

SEAM OF COAL was discovered 3ft. below the platform of Barnsley Exchange Railway Station last week, by workmen carrying out modernization.

MINING EQUIPMENT, worth £1,784, has been lent to the Barnsley College of Technology by the National Coal Board. It will be used for practical and theoretical instruction of mining students.

Mr. H. MAUGHAN, chief storekeeper of the South-West Durham Area of the Durham Divisional Coal Board, has received a presentation to mark his retirement after 41 years in the mining industry.

WHEN THE PIT TRAIN in which they were travelling plunged backwards 50 ft. down a steep incline, 15 of 24 miners on their way to their working place were injured at Cross Hands Colliery, near Llanelly, on Monday.

AYR AREAS mine rescue brigade eliminating competition for the Scottish Divisional Coal Board finals has been won by the joint Mauchline and Lochlea collieries team and Fauldean Colliery. The finals will take place on May 28.

EXPORTS FROM GRIMSBY during the four weeks ended February 28 showed a considerable drop on the 1959 figures for the same period. This was mainly accounted for by a drop in coal, coke, and patent fuel exports from 55,368 tons to 20,287 tons.

ONE OF the oldest deputies at Arkwright Colliery (Derbyshire), Mr. R. C. Bond, retired last Friday and was presented with a cheque from his workmates. He came from Grapwell Colliery to Arkwright when it first started and remained there until his retirement.

BROKEN LEG, cuts and bruises were the only injuries Mr. James Holmes (34), a deputy at Astley Green Colliery (Lancs), suffered when he fell from a cage 300 ft. from the pit bottom. He landed on top of another cage which was descending and it carried him to the bottom.

UPWARD TREND in productivity continues in the Durham Division of the NCB, reaching in the first 11 weeks of the year 22.05 cwt. per manshift, against 21.58 cwt. in the corresponding period of last year. At the face productivity averaged 64.88 cwt. per manshift, against 62.47 cwt. a year ago.

WOMEN FROM the village of Auchengeich presented more than £150, which they had collected, to Mr. Tom Green on Thursday of last week. Mr. Green was the sole survivor of the Auchengeich Colliery disaster in which 47 of his workmates died last September. He has not been able to work since the accident.

ONE OF THE Labour Party's observers at the Jugoslav Socialist Alliance conference in Belgrade during Easter will be Mr. Sam Watson, general secretary of the Durham Area of the National Union of Mineworkers. Afterwards, he will go on to Haifa, the Israeli seaport, as a Labour Party delegate at the Democratic Socialist International conference.

Mr. JIM HAMMOND, miner's agent for the Wigan Area, has been nominated by Lancashire miners as national president of the NUM. Mr. Hammond was a candidate in the first presidential ballot which was nullified because of the death of Mr. Alwyn Machen. Several Yorkshire branches have nominated Mr. Tom Roebuck, who for seven years has been delegate to Manvers Colliery NUM branch.

MR. L. WORMALD, who has been nominated by the Yorkshire Area of the National Association of Colliery Overmen, Deputies, and Shotfirers for the national presidency of the association, has been the Yorkshire deputies' agent since 1951. He will also stand for the vice-presidency and for a seat on the executive committee. His one opponent for the presidency is Mr. William Grundy, of the North-western Area, who is the present vice-president.

DEMONSTRATION against pit closings and unemployment in Lanarkshire is to be held at Motherwell on April 10. Speakers will include Mr. Thomas Fraser, MP for Hamilton, Mr. George Lawson, MP for Motherwell, Mr. Alex Moffat, vice-president of the Scottish area of the NUM, and Mr. Frank Gormill, assistant secretary of the Scottish Colliery Enginemen, Boilermen, and Tradesmen's Association.

COAL AND COKE shipments from the South Wales ports last week were 60,884 tons, compared with 59,373 tons the previous week and 49,009 tons in the corresponding period last year. Shipments from the various ports (with comparable 1959 figures in parentheses) were:—Newport, 5,076 (9,081) tons; Cardiff, 5,495 (5,908) tons; Penarth, 4,378 (5,212) tons; Barry, 17,264 (10,777) tons; Port Talbot 989 (2,455) tons; Swansea, 27,682 (15,576) tons.

THREE BROTHERS, with 171 years' service in the mining industry between them, retired from Aldwarke Main Colliery (Yorks) last Friday. They were Harry, Clifford, and Jack Ensor, the sons of a coal miner. They started work at Rotherham Main Colliery, later working at Barnburgh Main, Dinnington Main, Denaby Main, Thrybergh Hall, and for the last 32 years at Aldwarke Main. Jack (74), has been in the mines for 62 years; Harry (70), for 58 years; and Clifford (65), for 51 years.

Polish Coal Experts See British Plant

DELEGATION of Polish coal utilization experts, on a visit to Britain, was met at London Airport on Sunday evening by Mr. H. E. Collins, National Coal Board member for production and reconstruction, who in 1958 led a British technical delegation to Poland. During their stay, which ends next Friday, the visitors are touring gasworks, coke ovens, and coal and coke research laboratories.

Members of the delegation are: Mr. Ignacy Apt, general director of the Central Coal Sales Board; Mr. Kazimierz Wrobel, investment director of the combine of the brown coal industry; Prof. Wadysaw Olczakowski, director of the power and machinery division of the Chief Institute of Mining; Mr. Zdzisaw Wojtaszek, manager of the heating-machinery department of the Power Combine; Mr. Kazimierz Haubrich, chief of the industrial electrical power plants' division of the Ministry of Mining and Power; Mr. Romuald Wrzesniowski, head engineer of Engineering Enterprise of the Coal Industry; Mr. Damian Deja, senior counsellor to the fuel and power planning division of the State Planning Commission.

"Collieries Could Switch to Road Transport"

ALL modern collieries could switch to road transport of coal if required, said Mr. W. Summers, general manager of Alloa Area of the Scottish Divisional Coal Board, at a meeting of the Wallace group of the Forth Valley Junior Chamber of Commerce last week. Mr. Summers maintained, however, that the bulk of coal supplies would always go by rail.

He said that although British coal was the cheapest in Europe, one problem facing the board was to reduce production costs to make the industry pay. This was being tackled by increased mechanization in the mines. Alloa Area was already 55 per cent. mechanized.

THE COAL TRADE

ALTHOUGH a steady flow of orders is reported from all parts of the country there are signs that the seasonal demand is easing, with customers specifying particular qualities to a greater extent than for some time. Generally the industrial market is little more than average and, except in the Durham area, pressure for all cokes is relaxing slightly. Lack of comment on transport difficulties would indicate that, at least for the time being, merchants' worries are over in this direction.

SOUTH-WEST LANCASHIRE

There is a steady flow of orders for house coal, but the market is not really busy. The allocated tonnages are coming forward satisfactorily and there is a tendency towards the purchase of the cheaper grades of coal. Gas coke nuts for domestic use are in steady demand with good supplies available, while sales of "Coalite" and other smokeless fuels continue to show a steady increase and supplies are satisfactory. There is a continued shortage of anthracite stove nuts. The demand for gas coke and hard coke shows a steady decline, but there is a good demand for sized coke nuts.

The general industrial position is satisfactorily maintained with a consistently good demand and good service being given both by road and rail transport. The demand for bunker coals is very much reduced and no difficulty in supplying the full needs for foreign and coastal steamers is experienced.

Coastwise trade, apart from industrial fuels, from the Merseyside ports remains quiet. The following are the average prices (per ton) of household coals:—Group 1, 202s. 8d.; Group 2, 183s. 3d.; Group 3, 166s. 5d.; Group 4, 154s. 8d.; Group 5, 141s. 7d.; Group 6, 131s. 5d.; Group 7, 117s.

NOTTINGHAMSHIRE

House coal demands have fallen off considerably, the volume of domestic orders consisting mainly of small and urgent deliveries. Stocks at depots are low, with fewer arrivals from the collieries. The movement of smokeless fuels shows a steady flow of orders, and supplies for these are adequate.

Both gas and hard coke orders for domestic and central heating requirements have been reduced, but a steady demand is still maintained. Supplies are plentiful. The small arrival of anthracite has been disposed of and "Phurnacite" maintains its normal popular trade. Industrial tonnages continue to flow—on a slightly reduced scale, however.

NUM Resolution to Expel Yorkshire Enginemen

EXPULSION of members of the 560-strong Yorkshire Winding Enginemen's Association from affiliated membership of the National Union of Mineworkers is urged in a resolution to be placed on the agenda of the NUM annual conference in July. This move is being taken because the winders have refused to merge with the NUM. Last year, they received a directive from the union saying that December 31, 1959, was the merger deadline.

Mr. Frank Cope, a winder for 36 years, has been elected president of the association in succession to the late Ald. Horace Woodall, who died suddenly. Mr. Cope has been on the association's executive committee for 10 years.

Coal Stocks Position

DETAILS of coal stocks as at March 19, 1960, compared with those available at March 21, 1959, are given in the appended table issued by the Ministry of Power.

Figures in parentheses, mainly calculated on the basis of requirements during the winter, indicate the total weeks which the tonnage in stock would last.

Week ended:—	March 19, 1960.	March 21, 1959.
	Thous. tons.	Thous. tons.
Distributed stocks—		
Public-utility undertakings—		
Gas	1,903 (3.6)	2,219 (4.1)
Electricity	5,162 (4.6)	6,241 (5.9)
Railways	345 (1.7)	563 (2.7)
Coke ovens	1,541 (3.0)	1,413 (2.8)
Industrial consumers—*		
Iron and steel	219 (1.9)	226 (2.0)
Engineering and other metal industries	278 (3.1)	313 (3.5)
Other industries	1,722 (3.0)	1,817 (3.2)
TOTAL INDUSTRIES	2,219	2,356
Merchants' stocks—		
(*a*) House coal	701	782
(*b*) Anthracite and boiler fuel	138	100
Miscellaneous (estimated)	280	353
TOTAL DISTRIBUTED STOCKS	12,289	14,027
Undistributed stocks—		
At collieries (on ground and in wagons)	26,222	14,953
At open-cast sites	6,496	5,720
TOTAL UNDISTRIBUTED STOCKS	32,718	20,673

* Excluding stocks held by the smaller consumers of less than 1,000 tons per annum.

Recent Wills

TYZACK, EDGAR, retired tool manufacturer, of Bournemouth £110,496

ELLIS, H. V., director of the City Electrical Company, Limited, London, W.C.1 ... ... £77,114

DONALD, HERBERT, managing director of H. & E. Donald, Limited, coppersmiths, etc., of Leeds £15,311

PILKINGTON, WALTER, chairman and managing director of the Economic Gas Boiler Company, Limited £51,183

CARTER, J. S., former managing director of Chamberlain & Hookham, Limited, electricity meter manufacturers, of Birmingham £22,249

RANKIN, A. F., for 25 years Birmingham and South Wales technical sales engineer of the Watford Electric & Manufacturing Company, Limited ... £13,356

MCCALLUM, SIR WILLIAM, managing director of the British Structural Steel Company, Limited, from 1923 to 1949 and resident director in Buenos Aires from 1911 to 1949 ... ... £30,138

Orders Placed

Incandescent Heat Wins Big RTB Order

CONTRACT worth more than £1,250,000 for coil annealing plant at the new Spencer steelworks of Richard Thomas & Baldwins, Limited, at Llanwern (Mon), has been awarded to the Incandescent Heat Company, Limited, of Birmingham. It is believed to be the largest single order for steel sheet annealing plant ever placed in Britain.

The plant will have an output of 16,500 tons of 60-in.-wide strip a week (nearly 100 tons an hour). In all, 30 furnaces will be supplied of single and four-stack designs, together with furnace bases, forced cooling hoods, and other ancillary equipment. The furnaces are the company's well-known radiant-bowl-fired type, which have been supplied to leading steelworks in Britain and abroad.

STEELWORK FOR a large privately owned aircraft hangar in Canada is to be designed and fabricated by Octavius Atkinson & Sons, Limited, of Harrogate.

TEN TRACTOR SHOVELS powered by Perkins P6 diesel industrial engines have been ordered for Sweden from Bray Construction Equipment, Limited, of Feltham (Middx).

BUTADIENE EXTRACTION plant, one of three major plants for the £5,000,000 expansion at Grangemouth, has been ordered by British Hydrocarbon Chemicals, Limited, from Fluor Engineering & Construction Company, Limited, of London, E.C.2.

Two continuous automatic gas carburizing furnaces for installation in the transmission gear heat treatment section of the Ford Motor Company, Limited, Dagenham (Essex), are to be supplied by the International Furnace Equipment Company, Limited, Aldridge (Staffs).

FLOUR MILL with a capacity of 200 tons in 24 hours is to be built and equipped by Thomas Robinson & Son, Limited, flour and provender milling engineers, of Rochdale, for Liberty Flour Mills, of Manila, at a cost of $1,000,000. This is the third contract placed with the company for a flour mill in Manila.

THREE SWITCHGEAR ORDERS totalling £675,000 have been placed with the switchgear division of Associated Electrical Industries, Limited. They consist of air-blast circuit breakers for the South of Scotland Electricity Board and the Central Electricity Generating Board, and oil circuit breakers for the Eastern Electricity Board.

BULK ORDER of 600 Leyland 0.375 diesel engines fitted with C.A.V. fuel injection and electrical equipment has been placed with the industrial units division of Leyland Motors, Limited. The order comes from Oy Suomen Autoteollisuus A.B., Finland, and is valued at over £250,000. It brings the total number of Leyland engines ordered by Finland to over 6,000.

CONTRACT WORTH £500,000 for the design, supply, and construction of a crude oil sweetening plant to handle 250,000 barrels of crude oil a day has been placed with Foster, Wheeler, Limited, of Egham (Surrey), by the Iraq Petroleum Company. The plant will be erected at Kirkuk, Iraq, and will be similar to 11 plants of smaller capacity previously designed and erected there by Foster, Wheeler.

BYARD & COMPANY (ENGINEERS), LIMITED, of Edinburgh, has secured a contract for large diameter steel pipework for the new Spencer works of Richard Thomas & Baldwins, Limited, Llanwern (Mon), the largest contract received by the firm since it started this type of production 18 months ago. To fulfil the order, sheet steel from Colvilles, Limited, will be fabricated in the firm's Sighthill works, Edinburgh.

TWO BRITISH shipyards, Charles Connell & Company, Limited, of Scotstoun, and John Readhead & Sons, Limited, of South Shields, have won orders at fixed prices together worth about £2,000,000. Charles Connell is to build a fast diesel cargo-passenger liner of about 13,250 deadweight tons for the Ben Line. The John Readhead & Sons order is from Frank C. Strick & Company, Limited, for a 12,800 deadweight tons cargo liner.

POWER EXCAVATOR twice as large as any ever made is to be built by Bucyrus-Erie, of South Milwaukee, Wisconsin, a subsidiary of the Lincoln excavator manufacturers, Ruston Bucyrus, Limited. It will weigh 6,250 tons and provide 12,200 h.p. The machine is being built for the Peabody Coal Company of America and its power requirement is equal to that of a city of 12,000 people. The shovel boom will be 210 ft. high and in 50 seconds the machine will pick up 173 tons of material, dump it 464 ft. away, and be on its way back for the next load.

Iron-ore Imports

IMPORTS of iron ore and concentrates (except chrome iron ore and roasted iron pyrites) in February, and the totals for the first two months of this year and last, are shown in the table below.

From	Month ended Feb. 29.	Two months ended February 29.	
	1960.	1959.	1960.
	Tons.	Tons.	Tons.
Sierra Leone	77,520	113,340	143,210
Canada	99,120	102,040	223,405
Other Commonwealth countries and Eire	1,775	3,252	5,225
Sweden	368,158	446,804	740,061
Norway	18,091	79,572	58,305
France	51,956	62,013	93,143
Portugal	24,141	27,741	64,658
Spain	87,088	87,497	129,612
Algeria	144,228	298,289	324,833
French West Africa	—	44,698	—
Tunisia	71,552	121,183	121,247
Morocco (excluding Tangier)	68,267	92,162	138,242
Liberia	13,920	71,110	75,220
Venezuela	142,027	235,743	302,221
Brazil	68,178	91,460	109,533
Other foreign countries	57,382	17,995	117,581
TOTAL	1,293,403	1,894,899	2,646,496

Steel Mills Valuation Reduced on Appeal

BOTH the net annual value and the rateable value of Cordes Steel Mills, Limited, Newport (Mon), have been reduced, following an appeal to the Land Tribunal. The local valuation court last year reduced the net annual value of the works from £4,250 to £3,900 and the rateable value was fixed at £1,950.

The Land Tribunal has now issued a consent order reducing the net annual value to £3,000 and the rateable value to £1,500. Cordes Steel Mills, formerly known as Cordes (Dos Works), Limited, is one of the oldest works in Newport.

Appointments

Lubrication Training Scheme Specialist

FROM Gulf Oil (Great Britain), Limited, where he had been chief engineer (industrial) since 1958, Mr. Richard Brett has joined Centralube, Limited, makers of centralized, automatic, and hand-operated lubrication equipment, of London, N.W.10, as technical manager.

MR. RICHARD BRETT

After an apprenticeship in the chief mechanical engineer's department of the London, Midland & Scottish Railway, Mr. Brett joined the Air Ministry as a member of the Aeronautical Inspection Directorate. During the war he was seconded to the US Army Air Corps and later to British Overseas Airways. He joined Gulf Oil in 1959. He is a member of the American Society of Automotive Engineers and is also a specialist on lubrication training schemes.

Mr. T. J. NEAL has been appointed secretary of the New Consolidated Mines of Cornwall, Limited, St. Austell, in succession to Mr. H. B. Noon, who has resigned on leaving Cornwall.

Mr. R. P. JANION has been appointed sales engineer of the switchgear division at the Witton Works of the General Electric Company, Limited, responsible for switchgear for voltages of 3.3 kV and above.

Mr. WALTER DARLING, agent manager at Michael Colliery, East Wemyss (Fife) for the past two years, has left to take up an appointment in the production department at the headquarters of the Scottish Divisional Coal Board.

Mr. E. H. BATE, who retired last year as the chief civil engineer of the Ministry of Works has been appointed as consultant in the fields of civil and structural engineering to Morgan & Company, consulting engineers, of Leeds.

Mr. R. I. T. FALKNER has joined the Sperry Gyroscope Company, Limited, as general sales manager of the Brentford division, with special responsibility for aircraft and marine equipment. He succeeds Mr. R. E. LEETE who has moved to the central organization.

Mr. JOHN O. SEWELL has been appointed general manager of the British materials handling division and the British lock and hardware division of the Yale & Towne Manufacturing Company in succession to the late Mr. H. Gilbert Ramsell. He also becomes managdirector of E. Tonks & Sons, Limited, a subsidiary.

Mr. D. R. MACKAY has been appointed regional manager of the Midland sales region of Imperial Chemical Industries, Limited, in succession to Mr. T. H. Minton, who retired yesterday (Thursday) after 38 years' service with ICI and its predecessors. Mr. Mackay is succeeded as regional manager of the Scotland and Northern Ireland sales region by Dr. J. P. DICKSON.

Coal-face OMS Tops the 80-cwt. Mark

OUTPUT per manshift at the face in the week ended March 19, topped 80 cwt. for the first time. At 80.30 cwt. it was 1.7 cwt. up on the average for the first 11 weeks of the year and 5 cwt. better than in the corresponding week a year ago. Overall productivity reached 28.54 cwt., compared with 27.98 cwt. average so far this year and 27.48 cwt. a year ago.

Total saleable output was slightly down last week, but only a matter of 0.7 per cent. For the first 11 weeks of the year the rate of deep-mined output is now running at about 3.4 per cent. less than in 1959.

There were 618,700 wage-earners on colliery books on March 19, against 672,400 on March 21, 1959, the numbers engaged at the coal face being 237,200 and 261,700, respectively. Total absenteeism (all workers) in the week ended March 19, was 15.05 per cent., compared with 15.10 per cent. in the week ended March 21, 1959. Output at the face was 4.015 tons and overall 1.427 in the week ended March 19, compared with 3.763 and 1.374 in the week ended March 21, 1959.

The following table gives (in tons) the output of saleable mined coal by division in the week ended March 26, and the tonnage lost through all causes (holidays, disputes, and go-slows):—

Division.	Week ended March 26, 1960.		Week ended March 28, 1959.
	Total output.	Tonnage lost.	Total output.
Scottish	367,700	7,600	375,700
Northern (*N & C*) ..	245,900	—	262,300
Durham	471,000	—	485,100
North-Eastern ..	847,100	9,700	876,200
North-Western ..	277,500	2,300	293,400
East Midlands ..	919,000	1,500	911,800
West Midlands ..	301,500	500	321,700
South-Western ..	416,200	6,000	427,900
South-Eastern ..	30,300	—	33,000
Great Britain—			
Deep-mined coal..	3,876,200	27,600	3,987,100
Other deep-mined (including licensed mines) ..	50,700	—	54,700
Open-cast coal ..	169,500	—	241,700
TOTAL ..	4,096,400	27,600	4,283,500

Closing of Mining Training Centre "a Tragic Error"

MAINTAINING that the standards set at the National Coal Board's unique Mines Mechanization Training Centre, West Bar, Sheffield, might never be attained again for years, Mr. Harry Wilson, the centre's manager, said he felt the closing of the centre was "a tragic error." The centre closed on Thursday of last week and work has begun on dismantling the training equipment for dispersal to colliery centres all over the country.

Some 300 students were trained at West Bar at a time, but there has been a gradual run-down since the NCB announced its decision to close the centre nine months ago. Only nine of the instructing staff of 47 are still unplaced in alternative employment.

News in Brief

STEEL PRODUCTION in the United States this week is estimated by the American Iron and Steel Institute at 2,527,000 tons.

MORE THAN 100 miners were injured, over 30 seriously, in a clash between two rival unions at the strike-bound Miike colliery in Kyrushu, Japan, on Monday.

IN AN EFFORT to ease rush-hour traffic congestion, eight of the largest engineering firms in Derby, employing more than 15,000 people, on Monday introduced a "staggered hours" working week. Factories are finishing work at various times between 4.30 and 5.30 p.m.

THE 42-HOUR WEEK in the engineering and shipbuilding industries started on Monday. This means that more than 3,250,000 workers will receive 44 hours' pay for 42 hours' work in the largest single reduction in the standard working week since the 44-hour week was generally established in 1946-47.

ABOUT 40,000 shipyard and engineering works apprentices from 205 firms are backing the claim for a 50s.-a-week average rise in their wages. On Saturday a mass meeting was held at Greenock of all apprentices in shipyards and engineering works on the lower reaches of the Clyde and plans (which were not disclosed) were drawn up to further the claim.

SPEAKING AT the annual dinner of the Newcastle-upon-Tyne district of the Association of Chartered Shipbrokers, Mr. A. Anderson, chairman of the North-East Coal Exporters' Association, said that exports of coal from north-east ports had increased during 1959 and he believed there would be a further increase this year.

OXFORDSHIRE COUNTY COUNCIL has commissioned the Economist Intelligence Unit to examine the economic case for the mining of ironstone in north Oxfordshire. The unit's terms of reference are to investigate various economic implications of the use of home ore proposed by Dowsett Mineral Recovery, Limited, as opposed to using less home and more foreign ore.

RIGID ALUMINIUM foil container division of the Prestige Group, Limited, has been acquired by Invicta Foil & Cheswright & Nicholls, Limited, of Barking (Essex), a subsidiary of Imperial Aluminium Company, Limited. Although the effective transfer date is to-morrow (Saturday) the Prestige Group will continue to operate the division until manufacturing facilities can be transferred to Barking.

GROUP ENGINEERING centre to undertake the design and development of projects for the 25 companies forming the Simms Motor & Electronics Corporation, will open today (Friday). The centre will be at the Acton factory of Aircraft Steel Structures, Limited, and will be used particularly for projects for which it is considered uneconomic to maintain a separate engineering organization.

NEW FACTORY, costing about £500,000 and providing work for 1,000 people, is to be built on a 22-acre site at Chesterton for Jesshope, Limited, engineers and ironfounders etc. of Longport, Stoke-on-Trent. The gradual transfer of activities from Longport to Chesterton is planned to take place without interference to production. The whole scheme will take about five years to complete.

"TO GIVE opportunities for everyone of ability to rise to the top whether starting as a craft apprentice or joining the company as a graduate" is the purpose of a new extended training scheme announced by Dorman Long & Company, Limited, of Middlesbrough, on Monday. A school is to be opened at each of the company's main works to give apprentices a full training in new methods needed for the latest machinery.

INCREASING USE of Kanigen—the new chemical nickel phosphorus plating process operated in the UK by Albright & Wilson (Mfg.), Limited—is reflected in a recent agreement between the General American Transportation Corporation, of Chicago, and Union Carbide Nuclear Company, a division of the Union Carbide Company, Limited, of London, W.1, under which Union Carbide Nuclear will be licensed to operate the process.

COAL-FIRED steam generating power station has been built near Mercer in North Island, New Zealand, on a site close to large deposits of open-cast coal at Maramarua. British Insulated Callender's Cables, Limited, supplied some 126,000 yds. of power, communication, and control cables for the project, comprising mass impregnated non-draining, paper insulated, and mineral insulated cables for a range of from 33,000 v. to 660 v.

FOLLOWING A VISIT to Germany by executives of the company, Fredk. Parker, Limited, engineers and manufacturers of plant, quarry, and gravel pit machinery, etc., of Leicester has installed new machinery which enables it to use spinning and flow-turning methods with cold mild-steel plates up to $\frac{5}{8}$-in. thick. The company is among the first in the country to install the machinery which does away with much welding and prefabrication work, as well as reducing costs all round.

AT A COST of £1,500,000, a factory has been reconstructed above and around workers in the Bilston (Staffs) factory of Joseph Sankey & Sons, Limited, makers of metal pressings, stampings, etc. During the period of rebuilding, factory output increased by 12½ per cent., and the scheme has doubled the company's production capacity. The steel supports of the new buildings were lowered through holes made in the roofs of the old. The old buildings were then demolished underneath the new.

G. & J. Weir Extends French Interests

SUBSTANTIAL minority interest in the issued share capital of La Société d'Installations Thermiques et Auxiliares de Machines (S.A. ITAM), of Paris, has been acquired by G. & J. Weir, Limited, engineers and founders, of Glasgow. The two companies have also entered into an agreement for the co-ordination and exchange of technical effort on products in which they are jointly interested.

The agreement also provides for joint sales representation in the Italian market and for the appointment of S.A. ITAM as exclusive agents for the sale of all Weir products in France and Belgium.

Non-ferrous Metal Prices

(Delivered, unless otherwise stated)

Copper—Solid-drawn tubes, 2s. 5¾d. per lb.; rods, 273s. 6d. per cwt. basis; 20 s.w.g., 308s. 6d. per cwt.

Brass—Solid-drawn tubes, 2s. 0¾d.; sheets up to 10 w.g., 220s. 3d. per cwt.; wire, 2s. 10¾d.; rolled metal, 220s. 3d. per cwt.

Lead Sheets, etc.—Sheets, £112 15s.; pipes, £115 per ton.

Zinc Sheets, etc.—Sheets, 15 g. and thicker, ex works, English destinations, £123 17s. 6d.; rolled zinc (boiler plates), ex works, all English destinations, £121 12s. 6d.; zinc oxide (Red Seal), d/d buyers' premises, £102 10s. per ton.

Other Metals—Nickel, £600. Aluminium ingots, £186. Antimony, English, 99 per cent., £190. Quicksilver, ex warehouse, £70 10s. to £71. Bismuth (per lb.), 16s. nom. (1-ton lots). Cadmium, 10s. 6d. per lb. Magnesium ingots (per lb.), 2s. 2¾d. to 2s. 3d., notched bar 2s. 9¾d., powder 6s. 1d. Platinum, per oz. (troy), £30 5s.

Welsh MPs Protest on NCB Small Mines Plan

MOTION in the Commons deploring the National Coal Board's proposal "to extort unreasonably high royalties from small mines and to place restrictions on their output," has been tabled by four Conservative back-benchers, from Welsh constituencies, led by Mr. Raymond Gower (Barry).

Asking the board to abandon its proposals, the MPs claim that small mines have been producing coal efficiently and economically. The subject will be raised during an adjournment debate in the Commons next week by Mr. Rupert Spear, Conservative MP for Hexham.

This is the latest of a series of protest moves against the board's decision to issue new operating licences today (Friday) only if the pits agree to cut production by 40 per cent. and pay an extra 1s. 6d. a ton royalties. At a mass meeting in Cardiff last week, 200 private mine-owners decided to defer renewing their licences because of an unexpected development. They were hoping that top-level talks in which the board was engaged would lead to concessions enabling them to continue operating.

Mr. T. T. Lewis, chairman of South Wales and Monmouthshire Small Mines Association, commented after the mass meeting: "We hope the board will give further thought to this vital problem and realize how impossible its terms are. The feeling at the meeting was one of acute anxiety, bordering on desperation. Many owners have invested everything they possess in their mines, and they say they will have to shut down and lose everything."

In a letter to The Times on Wednesday, Mr. J. Wainwright, chairman of the Federation of Small Mines of Great Britain, writes: "Licensed mines must necessarily be economic units to survive, because they are individual entities and look to no one for financial support. On the contrary, they pay royalties to the board and contribute to the Treasury from their profits. They are subject to the same wages agreements as their big brothers and of course must comply with the same safety regulations." He asked whether it was fair, reasonable, or even in the national interest, that these licensed mines should be forced to submit to a far greater sacrifice than the board itself envisaged in its own operations.

The effects of the proposals are already being felt. In the Wigan area, nearly 100 men are to lose their jobs. Among these are 30 men at Wain Colliery, Billinge, and 36 of the 44 men employed at Baxter pit, Winstanley.

There is equal concern in north Staffordshire, where it is estimated that 27 small mines will be hit by plans to cut output. Mr. Reginald Statham, secretary of the North Staffs Federation of Small Mines, said that many of the men employed in them were elderly and would not readily take to deep mine working. "These men have given loyal service to the licensees and every effort is being made in their interests as well as those of the licensees themselves, to get some concessions from the board which will be more reasonable," he said.

Negotiations between the board and the federation about the terms of the new licences ended in London on Wednesday. During the two-day discussions, it is understood, the board agreed to modify its proposals so that production would not be reduced so drastically over the two year period. Federation representatives will report to their colleagues.

Obituary

Dr. C. A. EDWARDS

THE death occurred on Tuesday of Dr. Charles Alfred Edwards, FRS, Professor of Metallurgy of University College, Swansea, from 1920 to 1947 and principal of the college from 1927 to 1947. Dr. Edwards, who was born in 1882, was an assistant in the metallurgical department of the National Physical Laboratory, Teddington, from 1905 until 1907, when he became Lecturer in Metallurgy at the University of Manchester. After four years with Bolckow, Vaughan & Company, Limited, and with Dorman, Long & Company, Limited, he returned to Manchester as Professor of Metallurgy in 1914.

Dr. Edwards was the author of numerous publications on the properties of metals and alloys in the journals of the Iron and Steel Institute, the Institute of Metals, and the Institute of Mechanical Engineers and his work had also been published frequently in IRON AND COAL.

Mr. WILLIAM W. TENNANT, a former director of Bull's Metal & Marine, Limited, of Glasgow, has died at the age of 75.

Ald. ROBERT NEILL, founder of Robert Neill & Company, Limited, Sheffield, electrical engineers, etc., has died at the age of 76.

Mr. LEONARD WILLIAM BICKFORD SMITH, director of Newton Chambers & Company, Limited, of Sheffield, from 1938 until 1958, has died at the age of 83.

The death has occurred of Mr. DENIS RHODES at the age of 74. Mr. Rhodes was, until his retirement in 1948, chairman of Renold Chains, Limited, of Manchester.

Mr. HENRY WARREN SMITH, who until his retirement last year was a director of Hugh Smith & Company (Possil), Limited, hydraulic engineers, etc., of Glasgow, has died at the age of 67.

The death occurred on Saturday of Mr. ALBERT WILLIAM HEALEY, production manager of John Smith & Company (Derby), Limited, engineers and brassfounders. Mr. Healey was 58.

Former president of the Midland Institute of Engineers, and for 40 years manager of the Sherwood Colliery Company, Limited, Mansfield (Notts), Mr. CLEMENT ALBERT HEATHCOTE has died at the age of 85.

Mr. CYRIL JAMES SHENTON, chairman of James W. Shenton, Limited, ironfounders and general engineers, etc., of Tipton (Staffs), has died at the age of 59. Mr. Shenton entered the business, founded by his father, 40 years ago.

SACKED MINER NOT GUILTY

MINER who was dismissed from his job at Michael Colliery, East Wemyss, when an offence was alleged against him, was at a resumed hearing at Kirkcaldy Sheriff Court found Not Guilty of the offence. The miner, Mr. Andrzej Nikiperowicz, had denied refusing to be searched underground.

The local branch of the National Union of Mineworkers is to press for reinstatement for Mr. Nikiperowicz and repayment of wages lost since he was sacked. A National Coal Board official commented: "It is a matter for discussion at the pit."

Exports of British Coal

DETAILS of British coal exports and bunker coal shipments in February, and the totals for the first two months of this year and last, are given below.

	Month ended Feb. 29.	Two months ended February 29.	
	1960.	1959.	1960.
Categories.	Tons.	Tons.	Tons.
Anthracite—			
Large	6,662	3,626	14,033
Graded	18,779	41,622	39,401
Cleaned smalls	12,180	11,088	35,975
All other	31,203	75,137	66,315
Steam coal (including household)—			
Unscreened	3,864	12,555	6,049
Large	74,988	39,451	155,780
Graded	55,951	67,182	110,693
Cleaned smalls	95,360	44,196	190,698
Untreated smalls	77,637	128,688	174,883
Other	17,003	57,346	41,651
Gas coal—			
Unscreened	20,851	30,499	51,547
Large	1,792	1,224	5,088
Graded	35,593	42,848	78,620
All other	3,082	1,690	9,213
Coking coal—			
Cleaned smalls	993	9,886	3,043
Other	8,870	26,891	21,006
TOTAL	464,808	593,929	1,003,995
Destinations.			
Other Commonwealth countries	4,729	1,038	5,048
Eire	117,004	114,543	255,001
Finland	2,041	399	7,748
Sweden	16,896	34,365	41,158
Norway	14,042	23,853	23,493
Denmark	146,691	154,008	333,546
Western Germany	22,535	52,215	67,217
Netherlands	70,606	77,078	130,920
Belgium	12,476	55,921	37,604
France	15,150	47,278	37,967
Portugal	22,695	7,239	31,984
Italy	8,348	3,275	17,344
Argentina	—	13,737	7
Other foreign countries	11,595	8,980	14,958
Fuel taken on board vessels engaged in the foreign trade (including fishing vessels) for their own use—			
British flag	34,342	108,389	70,977
Other flags	3,772	9,729	8,006

Exports of Coke and Patent Fuel

THE following table gives figures of exports of coke and manufactured fuel from the United Kingdom during February, and the totals for the first two months of this year and last.

Products.	Month ended Feb. 29.	Two months ended February 29.	
	1960.	1959.	1960.
	Tons.	Tons.	Tons.
Gas coke	64,431	130,041	140,808
Hard coke	27,857	50,992	77,916
Breeze	29,527	61,560	63,713
Manufactured fuel	10,905	36,228	33,736
TOTAL	132,720	278,821	316,173

Imports and Exports of Mining Machinery

ACCORDING to Board of Trade returns, mining machinery (other than portable power tools) valued at £115,015 was imported during February, compared with £106,226 in February, 1959. Imports in the first two months of this year were valued at £185,448, against £241,158 in the corresponding period of last year.

The appended table contains figures of export values of mining and well-drilling machinery in February, and values for the first two months of this year and last.

Destination.	Month ended Feb. 29.	Two months ended February 29.	
	1960.	1959.	1960.
	£	£	£
Union of South Africa	50,373	90,620	160,769
Rhodesia and Nyasaland	8,592	55,445	9,505
India	109,512	245,657	220,814
Australia	48,945	40,294	62,801
Canada	39,325	40,712	76,729
Trinidad	16,428	39,249	36,891
Other Commonwealth countries and Eire	167,480	185,969	292,788
Netherlands	12,097	79,766	30,804
France	2,902	24,613	47,557
Venezuela	13,221	29,859	18,585
Other foreign countries	391,035	612,549	795,101
TOTALS.			
Well-drilling machinery—			
Petroleum	310,791	663,411	673,647
Other	48,419	57,788	87,269
Mining machinery (excluding portable power tools)—			
Coal-cutters, power-operated—			
Complete	9,949	93,825	124,522
Parts	106,278	105,162	177,101
Conveyors, underground—			
Complete and parts	195,065	126,662	273,790
Winders, power operated—			
Complete	2,745	52,888	59,619
Parts	17,507	19,739	36,741
All other	169,156	325,258	319,655
TOTAL	859,910	1,444,733	1,752,344

Sculpture to Perpetuate "Blaydon Races"

TO celebrate the forthcoming centenary of the famous Geordie song "Blaydon Races," written by a young miner, Newcastle-upon-Tyne Housing Committee has announced a competition for a piece of sculpture. The winning entry will be set up in Cruddas Park, near Scotswood Road, which was immortalized in the song, and will be in the centre of a redevelopment area to include a 20-storey block of flats and several 15-storey blocks.

"Blaydon Races" was written in 1862 to a tune already known as "Brighton" by George Ridley, who was crushed in a serious pit accident at the age of 20, and turned music hall artist. He started working in the pits at the age of eight and died when only 30.

NEXT COURSE of lectures on industrial and factory law, to be given by Mr. Harry Samuels under the auspices of the Industrial Welfare Society, will be held at Robert Hyde House, 48, Bryanston Square, London, W.1, from May 10 to 12.

Board Changes

Changes at Venesta Foils

FOLLOWING the acquisition of Venesta Foils, Limited, by Reynolds T. I. Aluminium, Limited, Mr. S. A. Field has resigned as chairman and is succeeded by Lord Plowden. Mr. Field has agreed to remain on the board during the period of transition. Mr. L. G. Rich has been appointed vice-chairman.

Other members of the board are Mr. J. L. Reynolds, Mr. A. D. Reynolds, and Mr. R. D. Young; Mr. D. L. S. Philpot is managing director and, following his appointment as deputy managing director, Mr. P. D. Pattrick has resigned from the board of Venesta, Limited.

VACTRIC, LIMITED—Mr. W. J. Darby has retired from the board.

PETER BROTHERHOOD, LIMITED—Mr. A. L. Busby has joined the board.

ALEXANDER STEPHEN & SONS, LIMITED—Mr. N. A. McCrae has joined the board.

ACROW (ENGINEERS), LIMITED—Major Victor B. J. Seeley has been elected to the board.

BRITISH INSULATED CALLENDER'S CABLES, LIMITED—Mr. H. C. Drayton has joined the board.

HENRY HOPE & SONS, LIMITED—Mr. Patrick Beesly has been appointed joint managing director.

VENESTA METAL CONTAINERS, LIMITED—Mr. C. G. H. Cooke has been appointed director and manager of the company.

W. E. NORTON (MACHINE TOOLS), LIMITED—Mr. W. J. Cooper has been elected a director and will continue as secretary of the company.

GARRARD ENGINEERING & MANUFACTURING COMPANY, LIMITED—Mr. Hector V. Slade, managing director, has been elected deputy chairman.

AMALGAMATED METAL CORPORATION, LIMITED—Mr. W. S. Kirkpatrick has been appointed a director and Mr. R. E. Stavert has resigned from the board.

JOHN BOLDING & SONS, LIMITED—Mr. J. L. H. Geffen, Mr. A. T. J. Goddard, and Mr. T. O. Tatlow have joined the board. Mr. Geffen has also been appointed general manager.

PREMIER LAMP & ENGINEERING COMPANY, LIMITED—Mr. R. L. Woosnam (75), chairman of the company and sole surviving original member of the firm, is to retire from active business on May 2.

CRANLEIGH GROUP, LIMITED—Mr. J. H. Fischel has been appointed an additional director. He was a director of the Millom Hematite Ore & Iron Company, Limited, at the time of its acquisition by the group.

WIRE INDUSTRIES STEEL PRODUCTS & ENGINEERING COMPANY, LIMITED—Mr. A. C. M. Cornish-Bowden has been appointed to the board with Mr. E. A. Thurman as his alternate. Mr. M. E. Rich has resigned as a director.

NEWTON BROS. (DERBY), LIMITED—Mr. F. V. Pipe, managing director, is retiring after 42 years with the company and its predecessors. He was chairman and managing director from 1950 to 1959. Mr. J. A. Garnett has joined the board.

HEPWORTH & GRANDAGE, LIMITED—Mr. Robert D. Umpleby, who since 1942 has been director in charge of the company's piston ring production, is to retire, although he will still act in a consultative capacity. Mr. Umpleby has been with the company for 36 years.

L. STERNE & COMPANY, LIMITED—Mr. P. B. H. Brown, while retaining his post as managing director, is to become chairman of the company in succession to Sir Samuel R. Beale, who is retiring. Mr. J. Dunlop has been appointed an additional director of the company.

STENOR, LIMITED—Mr. J. D. Goddard and Mr. D. M. Stoddart have been appointed to the board of the company, a member of the Firth Cleveland, Limited, group. Mr. Goddard and Mr. Stoddart will continue to be in charge of factor sales and home sales, respectively.

BOWMAKER (PLANT), LIMITED—Mr. Charles Jackson has been appointed a director and will be in charge of parts and service throughout the company's territory. Mr. Ronald Williams, who joined the company in 1949 as chief cashier and was later appointed secretary, has joined the board.

MONSANTO CHEMICAL COMPANY—Mr. Charles H. Sommer has been elected president of the US company in place of Dr. Charles A. Thomas, who has been elected chairman. The previous chairman, Mr. E. Monsanto Queeny, remains a member of the board and chairman of the finance committee.

HARDY SPICER, LIMITED—Mr. K. W. Evans, formerly managing director of Forgings & Presswork, Limited, a subsidiary of Birfield & Company, Limited, of which the company is also a subsidiary, has been appointed managing director in the place of Mr. M. S. Crosthwaite who now becomes technical adviser of the company and adviser to the Birfield group on the design and development of transmission equipment. Mr. R. K. Johnson, a director of Forgings & Presswork, has been appointed general manager of that company.

Creditors of Scrap Metal Firm May Lose £140,000

STATEMENT issued last week by the Liquidator, Mr. Donald Ward, indicated that the creditors of E. Hind (South Bank), Limited, the Tees-side scrap metal concern, which went into liquidation about a year ago, are expected to lose £140,000 when final settlement is made.

It was stated at the annual meeting of creditors in Middlesbrough, that after repayment of the company's bank overdraft and the costs of realization, preferential creditors could expect a full and first dividend of 3s. 6d. in the pound on the agreed claims for £233,000. Completion of the liquidation depended on the receipt of the amounts claimed from the directors.

The amount due from Mr. Edwin Foster had been provisionally agreed at £24,000, but the liquidator's claim against Mrs. Foster had not been agreed. The minimum was expected to be £83,300. It was expected that these two claims would provide a further dividend of about 4s. in the pound, but creditors would find they had lost £140,000.

ENGLISH STEEL FORGE & ENGINEERING'S ACHIEVEMENT

FOUR steam distributor drums for the Thorpe March power station, near Doncaster, are being completed by the English Steel Forge & Engineering Corporation, Limited, of Sheffield. They are claimed to be the longest one-piece hollow forgings ever made in this country. When completed, each drum will be 71 ft. long and weigh 38 tons.

They have been forged from ingots weighing 152 tons and are part of a larger order for forgings from the Central Electricity Generating Board. Because of the length of the drums, machining and heat treatment required special arrangements.

The Scrap Markets

From Glut to Shortage

WITHIN the past 12 months the position in the scrap markets has almost completely reversed. The glut has now turned into an acute shortage so far as the steelmakers are concerned, and nowhere is it more oppressive than on the north-east coast. Supplies have fallen far below the current requirements of the steelworks and the position continues to deteriorate.

Cleveland—Outlets for processed steel scrap are abundant and there is an active demand for other grades which can be used for steel smelting.

On the other hand activity in the cast-iron scrap market is still restrained and foundrymen find no difficulty in covering their requirements.

Lancashire—A fairly substantial aggregate tonnage of iron and steel scrap materials is reported still to be finding its way on to the Lancashire market, including textile machinery metal.

The steel mills are taking up a good quantity week by week of heavy melting scrap, and local foundries are reasonably steady buyers of cast scrap.

Scotland — Business has been well maintained. Deliveries are principally being made to the steelworks and it is surprising to what an extent this traffic has transformed the market to a state of acute activity. The output of new material continues at a very high level and it would appear that the demand for steelmaking scrap will be well maintained.

Steel turnings continue to be produced at a fairly steady rate and good tonnages are going forward to the various consuming works. The production of cast-iron borings is about average and all available supplies of this grade are readily accepted by the blast furnaces.

Trade with the cast-iron foundries is not so active as with the steelmakers and merchants for the time being must content themselves with whatever business is available. The lighter grades of cast iron are fairly readily disposed of, but with the heavier qualities, particularly machinery metal, the position is quite different.

Ferro-alloy Prices

(Per ton, unless otherwise stated, delivered)

FERRO-SILICON (6-ton lots and over)—45 per cent. Si, £41 10s. to £44, scale 15s. per unit, lumpy; 75 per cent. Si, £57 to £62 10s., scale 15s. per unit, lumpy.

FERRO-VANADIUM—50/60 per cent., 22s. 6d. per lb. of V.

FERRO-MOLYBDENUM—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

CALCIUM MOLYBDATE—12s. 4d. per lb. of Mo.

MOLYBDIC OXIDE BRIQUETTES—11s. 10d. per lb. of Mo, delivered United Kingdom.

FERRO-BORON—23/25 per cent., 7s. 6d. per lb.

FERRO-TITANIUM—20/25 per cent., 2-3 per cent. Cu, £250; 38/40 per cent., commercially carbon-free, £287.

FERRO-TUNGSTEN—80/85 per cent., 11s. 8d. per lb. of W.

TUNGSTEN METAL POWDER—98/99 per cent., 14s. 8d. per lb. of W.

FERRO CHROME (6-ton lots and over, lumpy)—4/6 per cent. C, £78 10s. to £82 10s., basis 60 per cent. Cr. scale 26s. to 28s. 6d. per unit; over 6 per cent. C, £77 to £80 10s., basis 60 per cent. Cr, scale 26s. to 28s. 6d. per unit; max. 2 per cent. C*, 1s. 8d. to 1s. 11d. per lb. Cr; max. 1 per cent. C*, 1s. 8½d. to 1s. 11½d. per lb. Cr; max. 0.15 per cent. C*, 1s. 9½d. to 2s. 0½d. per lb. Cr; max. 0.10 per cent. C*, 1s. 9½d. to 2s. 0½d. per lb. Cr; max. 0.06 per cent. C*, 1s. 10½d. to 2s. 1d. per lb. Cr.

METALLIC CHROMIUM—98/99 per cent., 6s. 10d. per lb.

METALLIC MANGANESE—94/96 per cent., carbon-free, £275; 96/98 per cent., £285.

FERRO-COLUMBIUM—65/67 per cent., Cb+Ta, 19s. 9d. per lb., Cb+Ta.

FERRO-MANGANESE (home)—78 per cent., £63 10s.

* *Average 68-70 per cent. Cr.*

Disturbing Rise in Accident Rate in Scottish Pits

CONCERN that the Scottish Divisional Coal Board feels at the rising rate of accidents in Scottish pits in recent months was referred to by Mr. L. R. Milligan, the divisional board's industrial relations director on Thursday of last week. Speaking of preventive measures, he said that he felt there should be more underground inspection by management of all grades. "If the management gives the proper lead," he said, "there will be a reaction in the pits. We have a duty to see to it that the accident rate does not cause public alarm."

Mr. Milligan was speaking at a dinner at Dysart (Fife) at which he presented the J. C. Williamson Cup for the Scottish Area with the lowest accident rate in 1959 to Mr. A. M. Stewart, production manager of the East Fife Area. The diploma for the pit with the best record in the Area was presented by Mr. J. McArthur, Fife District secretary of the NUM, to Mr. A. Hardie, manager of Balgonie Colliery.

Durham miners were also warned last week to become more safety conscious. Speaking at a social evening for miners at Seaham, Mr. S. W. Potts, general manager of the Mid-East Durham Area of the Durham Divisional Coal Board, said that the accident rate in his Area was the highest in the division last year.

There were three fatal and 47 serious accidents, as well as 9,000 minor accidents. Mr. Potts said that some men had had as many as 10 accidents during the year.

Local Authorities Confer to Control Spoil Heaps

PROBLEM of colliery spoil heaps will be discussed by all affected local authorities in Britain at a conference to be held in the mining village of Goldthorpe, near Doncaster, on April 27. The conference, the first of its kind, has been called by Dearne Urban Council, one of the leaders of a group of local authorities in South Yorkshire, which has persistently agitated for improved legislation to control the growth of spoil heaps.

Delegates will be asked to consider these two points: that the NCB should seek planning permission for all colliery spoil heaps and extensions without creating liability for compensation on being refused; and that the board should appoint a director of reclamation empowered to restore all tipping land to agriculture.

INDUSTRIAL PRODUCTION LEVELS OFF

INDEX of British industrial production has levelled off, after its 12-point increase since the beginning of last year. On a seasonally adjusted basis the index is now estimated to have been 119 (1954=100) in January compared with 117 in December and 107 in January, 1959. The provisional figure for February is 118-119, although it is subject to revision.

There are indications that the demand for goods in Britain continues to rise. In the Midlands and Southern England, where manpower reserves are small, labour shortages are affecting some smaller firms.

Imports and Exports of Iron and Steel

FIGURES of imports and exports of iron and steel in February are given in the following tables, which are based on Board of Trade returns.

Totals for the first two months of this year and last are also included.

Total Exports of Iron and Steel

Destination.	Month ended Feb. 29.	Two months ended February 29.	
	1960.	1959.	1960.
	Tons.	Tons.	Tons.
Cyprus	114	187	254
Sierra Leone	364	915	783
Ghana	1,017	4,901	3,125
Nigeria	4,697	10,465	10,883
Union of South Africa	5,090	11,121	12,103
Rhodesia and Nyasaland	1,740	3,595	3,246
Tanganyika	850	4,854	1,502
Kenya	1,551	5,593	3,587
Uganda	154	1,041	315
Mauritius	159	286	464
Aden	121	315	247
Bahrein, Qatar, and Trucial States	1,384	2,651	1,546
Kuwait	552	2,936	672
India	24,876	24,072	40,008
Pakistan	6,487	6,562	14,212
Singapore	521	4,651	2,491
Malaya	1,775	1,812	3,206
Ceylon	4,626	7,649	9,621
British North Borneo	613	342	935
Hongkong	5,523	9,894	11,886
Australia	16,792	18,053	30,535
New Zealand	7,895	15,036	15,433
Canada	15,969	17,963	39,117
Jamaica	2,186	3,363	4,076
Trinidad	2,467	5,863	6,843
British Guiana	689	982	1,222
Other Commonwealth countries	3,285	8,839	6,217
Eire	5,976	6,724	10,259
Soviet Union	1,246	518	3,460
Finland	3,402	3,732	6,449
Sweden	16,264	20,821	40,332
Norway	10,659	14,159	23,425
Denmark	8,615	11,739	17,982
Western Germany	15,474	17,431	35,017
Netherlands	13,310	9,882	24,403
Belgium	3,253	4,691	7,911
France	838	430	1,207
Switzerland	1,056	1,473	2,345
Portugal	1,483	2,971	2,622
Spain	1,687	2,669	2,829
Italy	3,178	7,582	7,783
Austria	150	421	612
Yugoslavia	1,738	796	1,906
Greece	1,404	1,391	3,127
Turkey	174	1,117	357
Netherlands Antilles	458	486	1,294
Portuguese East Africa	327	295	883
Egypt	2,313	536	3,679
Sudan	1,722	2,041	2,176
Lebanon	155	65	274
Israel	1,927	1,362	5,214
Saudi Arabia	73	631	98
Iraq	2,306	20,906	5,538
Iran	7,832	6,220	15,308
Burma	1,841	1,299	1,931
Thailand	224	1,785	1,934
Indonesia	1,982	609	4,663
China	6,353	17,678	13,804
Japan	2,529	3,425	11,137
Philippine Republic	485	520	2,132
USA	31,821	14,589	62,493
Cuba	588	1,080	1,558
Colombia	1,610	188	2,400
Venezuela	4,242	14,421	8,244
Ecuador	369	261	494
Peru	638	481	1,087
Chile	271	160	446
Brazil	985	1,923	3,424
Uruguay	1,071	277	1,911
Argentina	8,606	40,073	18,782
Other foreign countries	7,891	6,550	22,911
TOTAL	290,023	420,349	610,370

Total Imports of Iron and Steel

From	Month ended Feb. 29.	Two months ended February 29.	
	1960.	1959.	1960.
	Tons.	Tons.	Tons.
Union of South Africa	5,991	3,180	9,584
Rhodesia and Nyasaland	505	581	1,500
Canada	2,366	986	5,804
Other Commonwealth countries and Eire	2,209	1,465	6,515
Soviet Union	3,179	705	7,607
Sweden	4,418	4,539	7,228
Norway	13,335	11,468	22,120
Poland	3,000	466	3,086
Western Germany	11,907	3,924	26,443
Netherlands	14,106	19,919	30,114
Belgium	6,616	2,839	11,189
Luxembourg	1,016	894	1,661
France	5,286	2,254	9,327
Italy	1,285	130	2,345
Austria	1,455	392	2,038
Japan	751	300	1,175
USA	9,513	954	11,806
Other foreign countries	3,225	1,398	4,094
TOTAL	90,163	56,394	163,636
Iron and steel scrap and waste, fit only for the recovery of metal	17,707	707	23,606

Exports of Iron and Steel by Product

Product.	Month ended Feb. 29.	Two months ended February 29.	
	1960.	1959.	1960.
	Tons.	Tons.	Tons.
Pig-iron	18,669	20,950	44,416
Ferro-columbium (niobium)	7	12	21
Ferro-tungsten	101	334	208
Other ferro-alloys	861	573	1,537
Ingots, blooms, billets, slabs, sheet bars (incl. tinplate bars), and similar primary forms	7,740	18,707	13,302
Pieces roughly shaped by forging	68	74	113
Iron bars, rods, angles, shapes, and sections	138	128	346
Steel bars, rods, angles, sections, and shapes	50,839	42,045	111,475
Iron plates and sheets	111	12	147
Universal plates			
Steel plate, 3mm. and under 4.5mm. thickness	3,377	5,051	5,813
Ditto, 4.5mm. or more in thickness	26,069	17,645	50,460
Blacksheets and blackplate	24,091	40,727	53,547
Hoop and strip	8,691	11,513	16,335
Tinplate	49,549	79,238	107,197
Decorated tinplate	269	2,352	513
Galvanized sheets	5,886	13,731	11,131
Other (incl. tinned sheets, ternesplate, and ternesheets)	1,661	2,118	5,856
Railway and tramway construction material	10,828	31,677	19,482
Wire rods of steel (incl. alloy steel)	4,648	5,290	11,632
Wire	9,977	15,417	19,675
Tubes, pipes, and fittings	64,775	111,050	133,638
TOTAL	290,023	420,349	610,370

ORDER WORTH £2,300,000 to build a copper mill in Chile has been secured by the West German Klöckner concern. The cost includes supplies as well as the engineering of the project.

VERDICT OF ACCIDENTAL DEATH was returned by a jury at a Newcastle-upon-Tyne inquest on Thursday last week on Mr. George Winch (52), factory crane slinger, who was pinned to packing cases by 18 steel plates weighing 3,000 lb. during stacking operations at the Birtley factory of the Caterpillar Tractor Company, Limited. The jury recommended that methods of stacking plates on the racks should be investigated.

CURRENT PRICES OF IRON AND STEEL

(Delivered, unless otherwise stated)
March 31, 1960

PIG-IRON

Foundry and Forge Iron.—No. 3 iron, Class 2, Middlesbrough, £21 6s.; Birmingham, £20 18s. 3d., 10-ton lots or over.

Low-phosphorus Iron.—Over 0·10% to 0·40% P, 10-ton lots or over, £23 5s., delivered Birmingham, £23 10s., delivered Grangemouth.

Basic Pig-iron.—Delivered in Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leics, 10-ton lots or over, £20 3s.

Hematite.—Si up to 2%, S & P 0·03-0·05%: N.-E. (local iron), £23 19s.; Scotland (Scotch iron), Zone S.1, £24 5s. 6d.; Sheffield, £25 7s. 6d.; Birmingham, £25 14s.; Wales (Welsh iron), £23 19s., 10-ton lots or over in each case.

Refined.—Cylinder and refined irons, South Zone £25 9s., North Zone £25 6s. 6d. Refined malleable, max. 0·10% P, South Zone £26 9s., North Zone £26 6s. 6d.

MANUFACTURED IRON

(Bar basis, 2½ in. to ¾ in.)

CROWN IRON: England and Wales (Zone 1), £48 10s.; Scotland, £48 5s.; Ireland, f.o.q. Belfast, £50 7s. 6d.; all other Northern Ireland ports, £50 10s., f.o.q. Cable iron, £1 extra.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft, u.t., 100 tons and over, £31 15s. 6d.; tested, 0·08-0·33% C, 6 to 35 tons, £33 15s. 6d.; hard (0·41-0·60% C), under 10 tons, £34 17s.; silico-manganese, under 10 tons, £43 16s. 6d.; free-cutting steel up to 0·25% C, under 10 tons, £36 14s. 6d. SIEMENS-MARTIN ACID (under 10 tons): Up to 0·25% C, £41 1s.; silico-manganese, £44 4s.

Billets, Blooms, and Slabs for Forging and Stamping.—Lots of under 10 tons. Basic, soft, up to 0·33% C, £38 10s.; basic, hard, over 0·41 up to 0·60% C, £39 12s. 6d.; acid, up to 0·25% C, £43 4s.; acid silico-manganese, £46 7s.

Alloy Steel (5 tons to under 10 tons).—BILLETS, 3 in., up to and including 10 in., for re-rolling, 0·6/1% Ni, £47 7s.; Ni 2·75/3·75%, Cr 0·5/1·10%, £74 5s.; Ni 2·75/3·75%, Cr 0·5/1·3%, Mo 0·2/0·65%, £84 14s. BARS: 1 in. dia. and up, nickel, £68 10s.; nickel-chrome, £99 4s.; nickel-chrome-molybdenum, £111 17s.

Other Semi-products, etc.—Forging ingots, up to 0·60% C, £31 12s. 6d. f.o.t.; tube billets, under 10 tons, £40 10s.; shell steel billets for direct forging up to and including 0·33% C, 100 tons and over, £37 15s.; tin bars and sheet bars, 50 tons and over, £32 10s. Wire rods, 3g. to 4g. (all areas except Birmingham, Seotland, Southern Joint Area, and Northern Ireland): Soft basic, under 50 tons, £41 2s.; hard basic, under 10 tons, £44 8s.; free-cutting, up to 0·25% C, under 10 tons, £46 12s.; acid, up to 0·75% C, under 10 tons, £54 14s. 6d. Stainless steel billets, 3 in. and over, 5 tons to under 10 tons, Austenitic, £229 10s.; martensitic, £141 10s.

FINISHED STEEL

Heavy Products (1 ton to under 10 tons).—Mild-steel plates, ordinary qualities, N.-E. Coast and Northern Joint Areas and Central Scotland, £41 12s.; medium plates, all areas of England and Wales, £45 1s. 6d.; boiler plates, N.-E. Coast and Northern Joint Areas and Central Scotland, £44 2s.; floor plates, N.-E. Coast, £43 1s. Sections (N.-E. Coast, Midland, and Northern Joint Areas, and Central Scotland): Angles, £38 16s. 6d.; bars (rounds and squares), £41 6s. 6d.; flats, £39 1s. 6d.; joists, £38 12s. 6d.

Rolled and Re-rolled Steel Products.—N.-E. Coast, Midland, Northern Joint, and South Wales Areas, and Central Scotland, 50 tons and over: Angles and tees, 4 un. in. and under, £40 18s. Channels, 3-in. web and under, £40 18s. Flats, 5 in. wide and under, and rounds and squares, under 3 in.: Untested soft basic, £39 1s.; free-cutting, £45 1s. 6d.; hard basic, £41 19s. 6d.; Siemens Martin acid, £49 0s. 6d.; spring steel, basic, £44 4s. 6d. spring steel, acid, £52 19s. Glazing tees, £47 0s. 6d. Sash and casement sections, £43 13s. 6d. Gate channels, £50 17s. 6d. Ferro-concrete bars (10 tons to under 500 tons), £39 10s.

Sheets and Strip.—Uncoated strip mill coils, hot rolled, under 3 mm. to 12g., mill run, mill edge, 25 tons to under 50 tons, £43 16s.; cold reduced, 17/20g., side trimmed, skin passed, £49 16s. Black sheets, 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £68 5s. Cold-rolled steel strip, coils, hard temper, not annealed, 10 tons to under 20 tons, £55 15s. Hot-rolled hoop and strip, u/t soft basic, 100 tons and over, £38.

Tinplates.—Cold reduced, hot dipped, 15 tons to under 50 tons, 66s. 8d. per basis box of 108 lb., f.o.t. makers' works. Cold reduced electrolytic, 59s. 9d. per basis box.

Colliery Rails and Arches.—Arches, 4 in. × 2½ in. × 2 in., re-rolled £39 15s., 3 in. × 3 in., re-rolled £40, 3½ in. × 3½ in., re-rolled £40 7s. 6d., 4 in. × 2½ in. × 2 in., prime £44 6s. 9d. Other sections, prime £44 11s. 9d. Extra fishplates, £52 10s. Cambered girders, 4 in. × 2½ in. × 2 in., re-rolled £38 9s., 3 in. × 3 in., re-rolled £38 11s. 6d., 3½ in. × 3½ in., re-rolled £38 18s. 6d., 4 in. × 2½ in. × 2 in., prime £43 4s. Other sections, prime £43 6s. 6d. Benk bars, standard type, prime material, all thicknesses, £38 11s.; re-rolled, up to ¾ in., inclusive, £37 6s.; over ¾ in., £38 11s. "W" type bars, prime steel, all thicknesses, £41 1s.; re-rolled, up to ¾ in., inclusive, £39 16s.; over ¾ in., £41 1s.

Bright Steel (10 tons to under 20 tons).—Bars, no analysis or test, £52 8s. 6d.; flats, untested, £70 3s. 6d.

High-speed Tool Steel.—Finished bars, 5% cobalt, 10s. 10d.; 14% tungsten, 6s. 11d.; 18% tungsten, 7s. 9d.; 22% tungsten, 9s. 2d.; 4/6 quality molybdenum tungsten, 6s. 3d.; 6/6 quality molybdenum tungsten, 6s. 5d.; 5/6/2 quality molybdenum tungsten vanadium, 6s. 7d. per lb.

Rails, etc.—F.B. rails, heavy, 75 lb. to under 90 lb., 500 tons and over, f.o.t., £39 15s.; fishplates for rails 80 lb. and over, 50 tons and over, f.o.t., £53 11s.; soleplates, f.o.t., 100 tons and over, £51. Light flange rails, 25 lb. and under, d/d N.-E. Coast, Midland, Northern Joint, and South Wales Areas, and Central Scotland, 50 tons and over, £40 17s. 6d.; fishplates for light rails, 50 tons and over, £50 12s. 6d.

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Heavy mixed scrap*	207 3	206 3	198 6	204 3	203 9	205 3	210 3
Heavy steel turnings†	179 9	179 9	169 9	176 9	174 3	177 0	180 0
Heavy cast iron†	206 9	203 9	208 0	204 3	189 3	199 3	205 9
Cast-iron borings†	160 3	157 3	157 0	159 9	157 3	159 6	164 6

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Principal.

Wigan and District Mining and Technical College,
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March, 1960.

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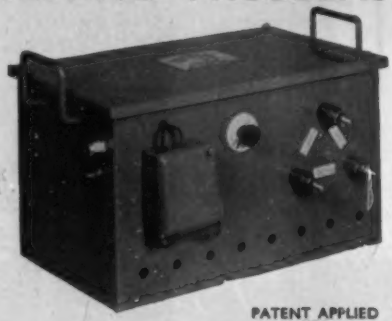

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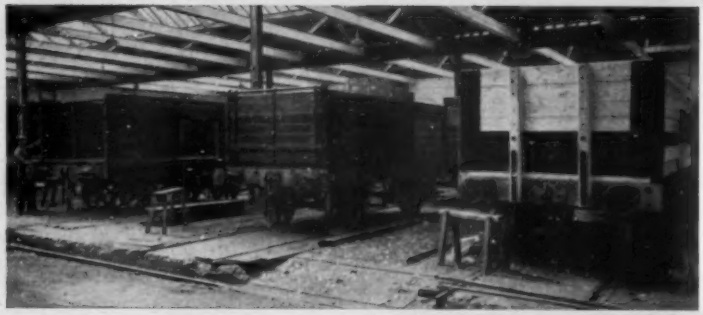

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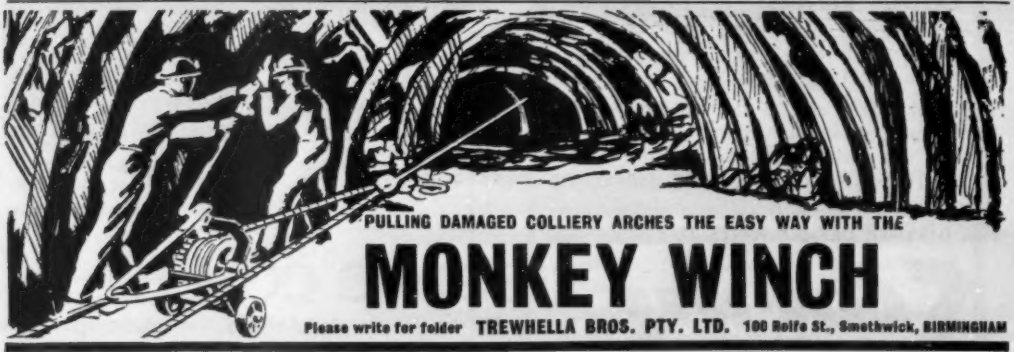

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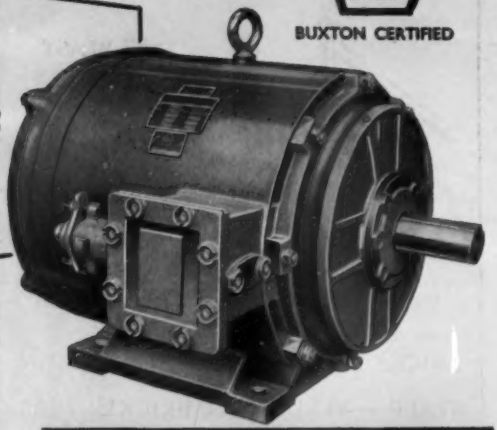

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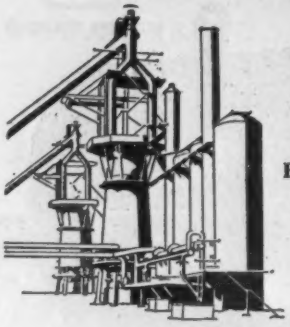

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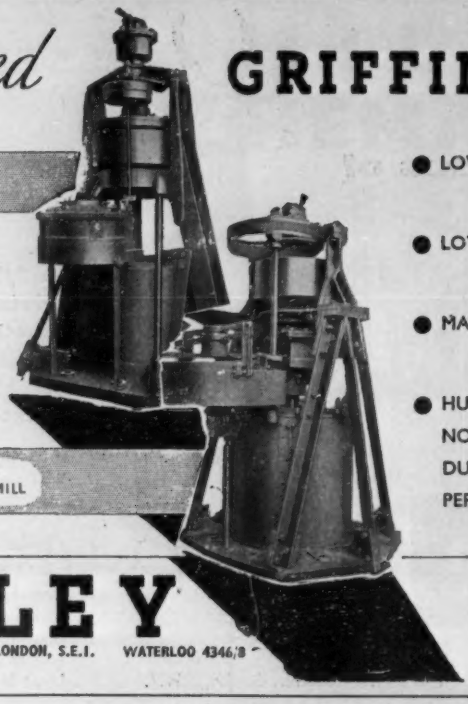

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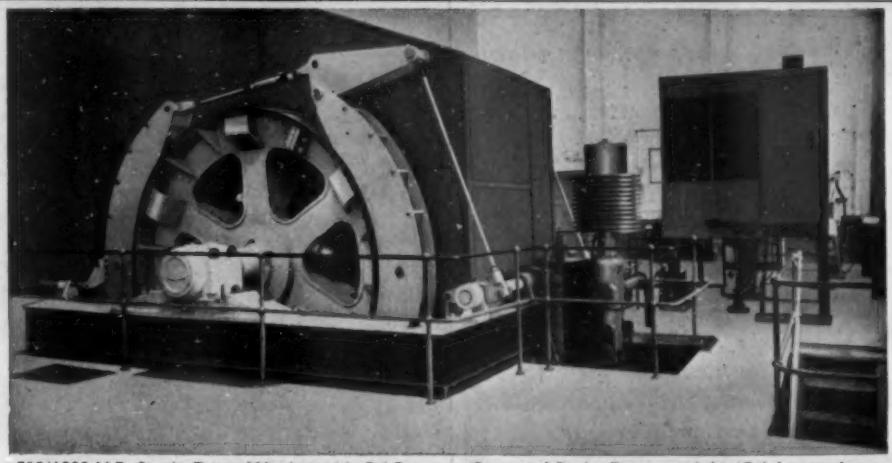

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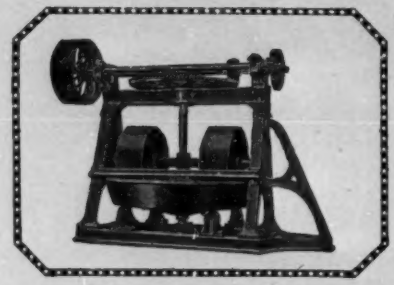

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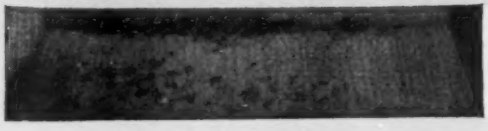

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